Division of Geological & Geophysical Surveys
SPECIAL REPORT 50

Alaska's Mineral Industry 1995

in cooperation with the
Division of Trade & Development
Division of Mining & Water Management

FRONT COVER

Top left: *From late 1991 to 1993 Cambior Alaska Inc. constructed the first phase of a two-phase reclamation program. Phase one channeled the stream around the open-pit mine operations. During the stream diversion the company closely monitored water quality, stream flow, and fish populations. When the mine closed, Valdez Creek was diverted back to its original location. Cambior constructed a channel about 1 mile (1.6 kilometers) long through which the water returned to its original location. Photo by T.K. Bundtzen.*

Top right: *Beginning excavation work on Pit A-8 of Valdez Creek gold mine operated by Cambior Alaska Inc. as it appeared in early August 1994. From 1984 to 1995 Cambior Alaska and previous operators produced 459,162 ounces (14,279 kilograms) of refined gold from the Valdez Creek (or Denali) placer mine, which is 18 percent of all the gold mined in Alaska during that period. Photo by T.K. Bundtzen.*

Middle: *Upon mine closure in 1995 Cambior Alaska worked with the U.S. Bureau of Land Management and the State of Alaska to design and create a post-mine-use environment. Shown here is a section of the final production pit (A-8), which filled with water to form a lake 2,800 feet long x 1,000 feet wide (853 meters x 305 meters). The shoreline has been recontoured for accessibility by people and wildlife. All other production pits were backfilled during mine operation. Reclaimed mine tailings are in foreground. Photo by George Bell, Cambior Alaska Inc.*

Bottom: *Two caribou bulls feed on revegetated (with clover) and reclaimed tailings and backfill in the former Valdez Creek gold mine in Valdez Creek valley. Recontoured Pit A-7 is shown in foreground. Photo by George Bell, Cambior Alaska Inc.*

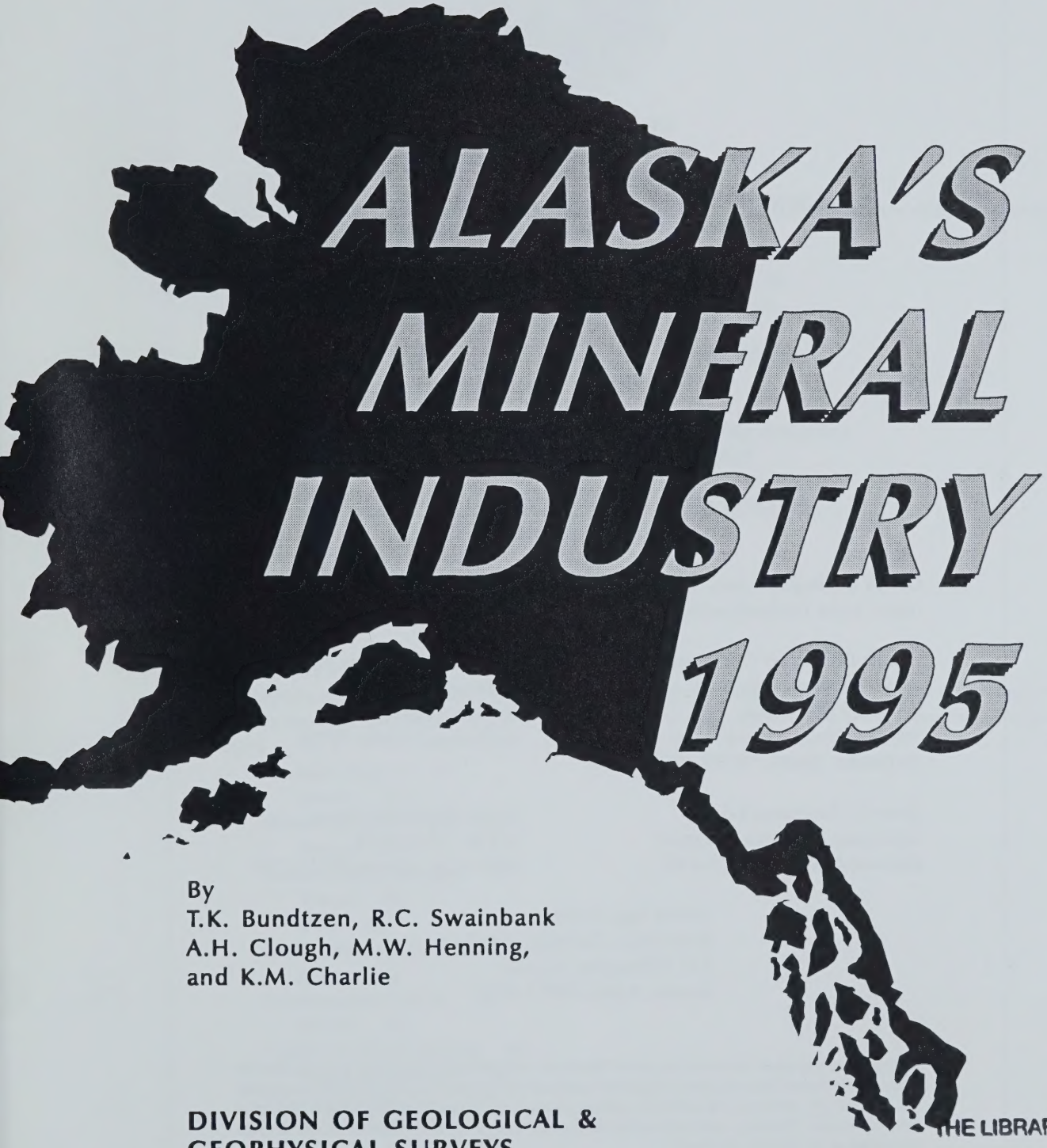
BACK COVER

Top left: *A 91.77 ounce (2.85 kilogram) gold nugget mined in the Kantishna district on August 15, 1984, by Alaska miner Mic Martinek. This nugget is the fourth largest nugget ever mined in Alaska and the largest nugget that remains in the state. Photo by Martinek Mining Co.*

Top right: *Mine construction at the Fort Knox Gold Project, Fairbanks district. Fairbanks Gold Mining Inc., operator of the mine, selected Morrison Knudsen Corp. as a general contractor for the project and Kiewit Pacific Co. to complete all earthwork. In August 1995 Fort Knox employed 720 construction workers on the mine site. The project is expected to go into production in the fourth quarter of 1996. It will be Alaska's largest gold mine. Photo by R.C. Swainbank.*

Lower left: *Doyon shareholder Herman Steffen and driller John Branwold of Alaska Blasters Inc. of Anchorage adjust the drill stem of a mobile drill unit at Noir Limestone Quarry 8 miles (12.8 kilometers) east of McGrath. The men are preparing limestone of various size classifications to be used as riprap to prevent river erosion near McGrath and for D-1 road metal and roadfill applications. The quarry is owned by Doyon Ltd. Photo by Roger Jenkins.*

Lower right: *Dave Petrie of ABS Alaskan Inc. in Fairbanks loads a pallet of spent lead-acid vehicle batteries into tractor trailer bound for G&B Batteries Inc. in California. G&B operates a custom smelter and reprocessing plant that recycles the entire battery including lead plates, plastic cases, and acid. Photo by T.K. Bundtzen.*



ALASKA'S MINERAL INDUSTRY 1995

By
T.K. Bundtzen, R.C. Swainbank
A.H. Clough, M.W. Henning,
and K.M. Charlie

DIVISION OF GEOLOGICAL &
GEOPHYSICAL SURVEYS

SPECIAL REPORT 50

STATE OF ALASKA
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Publication of this report is required by Alaska Statute 41 "to determine the potential of Alaska land for production of metals, minerals, fuels, and geothermal resources; the location and supplies of groundwater and construction materials; the potential geologic hazards to buildings, roads, bridges, and other installations and structures; and shall conduct such other surveys and investigations as will advance knowledge of the geology of Alaska."

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I am pleased to report that by the end of 1995 about a dozen major exploration projects filed notification of intent to take advantage of the mineral exploration incentive program that I signed into law in June 1995. This program allows deduction of up to $20 million from future taxes for qualified exploration expenses. The incentive program shows that the state is willing to recognize the high-risk nature of exploration investment and will act as a partner in responsible development.

Another state-sponsored program supported by my administration is the airborne geophysics program of the Division of Geological & Geophysical Surveys. The data released in the spring of 1995 helped spur exploration in the Fairbanks area. We believe that by providing this type of data, Alaska can help reduce the risk involved in the early stages of exploration for decades to come.

Most indicators suggest that the mineral industry is beginning a period of sustained growth. Evidence of this growth is seen in the advent of a new hardrock gold mine at Nixon Fork near McGrath. Other developing gold mines add to our optimistic outlook. We have major development underway at Fort Knox, Illinois Creek, Kensington, and the Alaska-Juneau Mine, and new discoveries at Red Dog and Greens Creek.

However, our placer mining industry, which provides many job opportunities in rural Alaska, has been in decline for the last several years. We hope to see a leveling off of that trend in 1996 and perhaps some stability and growth in the coming years.

Increases in metal and mineral-product recycling in 1995 signal the growing maturity of this much needed part of Alaska's mineral industry.

Finally, my administration is pleased to provide recognition to those companies that demonstrate a commitment to excellence in reclamation at mine closure. This year we issued 11 reclamation awards to mining companies, including my Governor's Award to Cambior Alaska at Valdez Creek. Alaska is proud to be a partner in such operations.

Tony Knowles
Governor

FOREWORD

Alaska's Mineral Industry 1995, Alaska Division of Geological & Geophysical Surveys Special Report 50, is the 15th annual report jointly produced by the Department of Natural Resources and the Department of Commerce and Economic Development. The primary objective of the report series is to provide accurate information about Alaska's mineral industry activities during each calendar year. Most of this information is provided voluntarily by private industry, Native corporations, individuals, and government agencies.

The value of mineral production during 1995 was $537.2 million, up 6 percent from 1994 levels. Mineral exploration expenditures increased modestly from $31.1 million in 1994 to $34.3 million in 1995. Mine development investments increased from $44.9 million in 1994 to $148.6 million in 1995 or by more than 230 percent. The total value the mineral industry in Alaska during 1995, as measured by the sum of production, exploration, and development investments, was $719.8 million, up 23 percent from the $583.5 million total for 1994.

In 1995 there were many signs of growth and change in the Alaska mineral industry. Cominco Alaska Inc. continued to increase production of zinc-lead-silver concentrates from the Red Dog mine in Northwest Alaska. The mine is now recognized as the largest producer of zinc in the world. In 1995 it supplied approximately 8 percent of the world's mine-produced zinc. Cominco nearly doubled its mineable reserves at Red Dog with the discovery of their new Aqqaluk Deposit, about one-third mile (one-half kilometer) north of the currently producing Main Deposit site.

The mill expansion project at the Red Dog mine and development projects at the Fort Knox and the Nixon Fork mines contributed many new jobs to the Alaskan economy. Construction started on the Healy Clean Coal Project, which will burn coal supplied by Usibelli Coal Mine Inc. Greens Creek Mining Co., a Kennecott subsidiary, announced reopening of the Greens Creek polymetallic mine. Two major development projects continued in the Southeastern region—Coeur Alaska's Kensington mine and Echo Bay Mines Alaska Inc.'s Alaska Juneau mine. Both gold mine projects will be fully committed to permitting efforts in 1996.

There were fewer jobs opportunities in placer gold mines and in industrial mineral quarries throughout the state. Gold production declined about 22 percent, and there were 36 fewer placer mines than in 1994. Cambior Alaska's Valdez Creek Gold mine, the state's largest gold mine for 12 years, closed permanently in September 1995. The placer industry, which employs many rural Alaskans, is expected to stabilize at a lower level of activity in 1996.

Alaska's metal and mineral-based recycling industry continued to grow. In 1995, largely as the result of high ferrous scrap-metal prices in Asian and U.S. west coast markets, the dollar value increased by nearly 50 percent.

Overall mineral-industry-related employment increased 10 percent, from 3,083 in 1994, to 3,406 in 1995.

The State of Alaska, through the Division of Geological & Geophysical Surveys, contracted for aeromagnetic geophysical mapping in the Rampart and Manley areas. The results were released in the spring of 1996.

For the second year, the State Department of Natural Resources presented reclamation awards to mining firms for exemplary work in returning disturbed ground to useful condition as required by state law.

Milton A. Wiltse, Acting State Geologist
Division of Geological & Geophysical Surveys

Deborah B. Sedwick, Assistant Commissioner
Division of Trade and Development

Jules Tileston, Director
Division of Mining & Water Management

Alaska's Mineral Industry 1995

T.K. Bundtzen,[1] R.C. Swainbank,[2] M.W. Henning,[3] A.H. Clough,[4] and K.M. Charlie[5]

EXECUTIVE SUMMARY

This report summarizes mineral industry activity during the 1995 calendar year. As in past years, the Department of Natural Resources (DNR) produced the report in cooperation with the Department of Commerce and Economic Development (DCED). Much of the information it contains is based on a questionnaire sent by the Division of Geological & Geophysical Surveys (DGGS) to 985 and returned by 153 companies, individuals, and government agencies involved in mineral extractive industries.

In 1995 there were many signs of continued growth and change in Alaska's mineral industry. The total value of production and the sum of exploration and development expenditures in 1995 totaled $719.8 million, up 23 percent from the $583.5 million total for 1994 (table 1). Figure 1 illustrates the expenditures for exploration and development and the value of production since 1981, the year this report series was initiated.

Table 1. *Total value of the mineral industry in Alaska by year (in millions of dollars)*

	Exploration	Development	Production	Total
1981	$76.0	$26.4	$188.6	**$291.0**
1982	45.0	41.6	196.4	**283.0**
1983	34.1	27.8	232.4	**294.3**
1984	22.8	53.6	199.4	**275.8**
1985	9.2	34.1	226.6	**269.9**
1986	8.9	24.3	198.5	**231.7**
1987	15.7	100.3	202.4	**318.4**
1988	45.5	275.0	232.2	**552.7**
1989	47.8	134.3	277.0	**459.1**
1990	63.3	14.3	533.0	**610.6**
1991	39.9	25.6	546.5	**612.0**
1992	30.2	30.0	560.8	**621.0**
1993	30.3	27.7	448.7	**506.7**
1994	31.1	44.9	507.5	**583.5**
1995	34.3	148.6	537.2	**719.8**
TOTAL	**$534.1**	**$1,008.5**	**$5,087.2**	**$6,629.5**

SOURCE: Alaska's mineral industry reports published annually by DGGS.

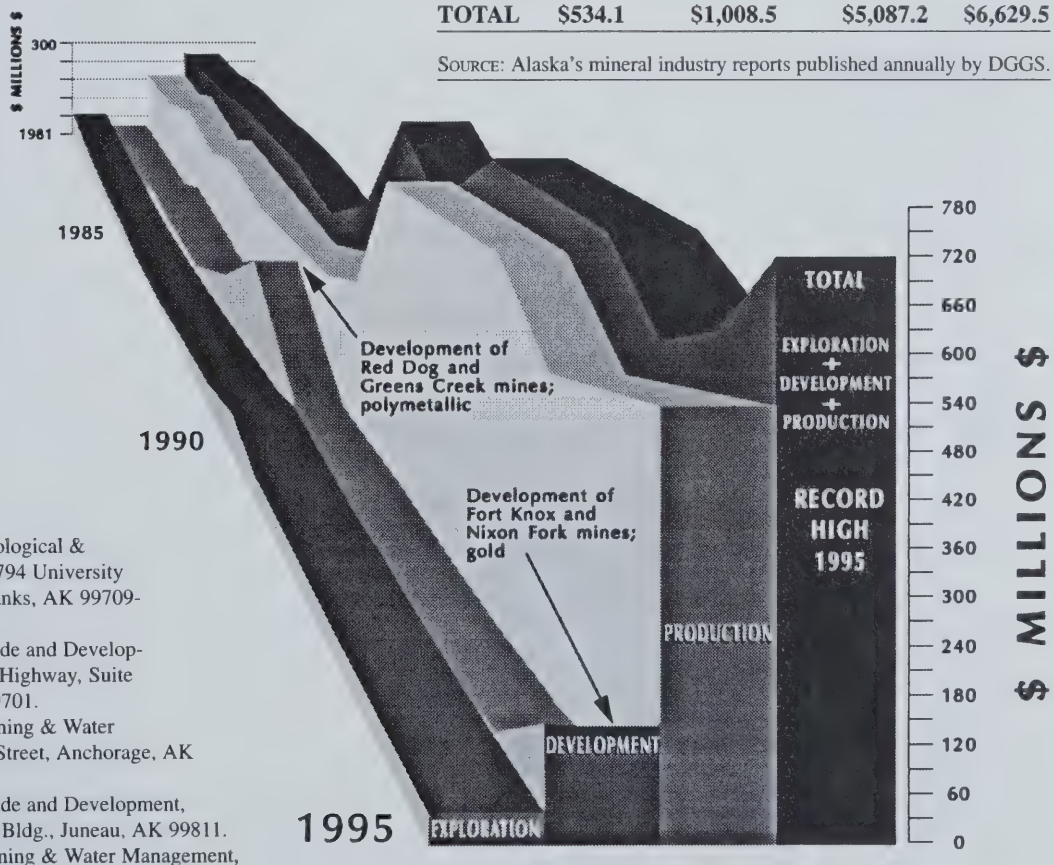

Figure 1. *Alaska's mineral industry total value, 1981–95.*

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[5]Alaska Division of Mining & Water Management, 3700 Airport Way, Fairbanks, AK 99709.

EMPLOYMENT

Alaska's mineral industry provided an estimated 3,406 direct, full-time-equivalent jobs in 1995, an increase of 323, or 10 percent more than the 3,083 mining jobs in 1994 (table 2; fig. 2). Most of the added job opportunities can be attributed to mill expansion activities of the Red Dog zinc-lead-silver mine and to the Nixon Fork and Fort Knox gold development projects. Contrasting these increasing job opportunities were fewer jobs in placer gold and industrial mineral employment.

EXPLORATION

Reported exploration expenditures in 1995 grew 10 percent to $34.31 million from $31.10 million in 1994 (table 1). Although exploration took place throughout the state, exploration continued to be most active in the Southeastern region, followed by the Eastern Interior and Western regions (fig. 3).

DNR continued its airborne geophysical survey. In 1995, DNR selected the Hot Springs–Rampart area for study. The geophysical data obtained from this was released as various maps, reports, and computer files in March 1996.

Table 2. *Alaska mine employment, 1990–95*[a]

	1990	1991	1992	1993	1994	1995
Gold/silver/mining						
Placer	1,151	1,240	1,251	1,205	1,150	975
Lode	N/A	N/A	N/A	N/A	- -	38
Polymetallic	265[b]	35[b]	240[b]	26	- -	
Base metals	350	331	349	376	311	397
Recreational	315	320	325	270	280	255
Sand & gravel	645	685	640	580	640	577
Building stone	160	165	145	205	210	200
Coal	115	115	115	109	115	120
Peat	N/A	45	40	49	55	30
Tin, jade, soap-stone, ceramics, platinum	40	25	20	20	25	20
Mineral development	95	133	164	132	115	637
Mineral exploration	374	268	137	164	182	157
TOTAL	**3,510**	**3,562**	**3,426**	**3,136**	**3,083**	**3,406**

[a]Calculated on a 260-day work year.
[b]Revised estimate based on new company data.
N/A = Not available.
- - Not reported.

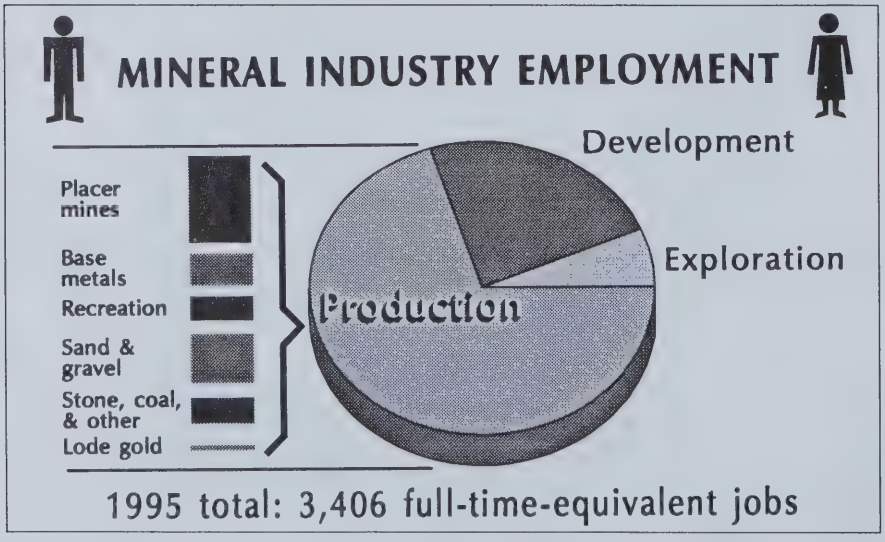


Figure 2. *Mineral industry employment by category, 1995.*

DEVELOPMENT

Alaska mineral development levels jumped from $44.94 million in 1994 to $148.58 million in 1995, an increase of 234 percent (table 1). Mill expansion work at the Red Dog Mine and construction of the Fort Knox and Nixon Fork gold mines accounted for 86 percent of the total 1995 statewide development expenditures. Substantial development projects that focused on reopening the Greens Creek polymetallic mine on Admiralty Island and Kensington and Alaska-Juneau (A-J) gold projects—all in the Southeastern region—also started in 1995; these activities are expected to expand greatly in scope during 1996.

Development was initiated for a limestone quarry on Prince of Wales Island.

PRODUCTION

Gross value of Alaska's mineral production was $537.21 million, up 6 percent from the 1994 estimate of $507.50 million (table 1). Two factors were responsible for much of the production increase: (1) a 15 percent increase in lead and zinc concentrates from the giant Red Dog zinc-lead-silver mine in the Northern region, and (2) a record 1,640,000 tons (1,487,808 tonnes) of coal production from Usibelli Coal mine in the Eastern Interior region.

However, gold production decreased from 182,100 ounces (5,663 kilograms) worth $70.29 million in 1994 to 141,882 ounces (4,410 kilograms)[6] worth $56.04 million in 1995, a decline of about 22 percent by weight and 20 percent in value. Major contributing factors to the decline in gold production were the September 1995 closing of Cambior Alaska's Valdez Creek Mine, and the loss of 36 additional smaller placer mines statewide. The Nixon Fork hardrock gold-copper deposit began production in mid-October. This mine should help make up for some of the gold production losses that are expected to occur in placer mines in 1996.

The value of industrial mineral output (sand and gravel, building and ornamental stone) dropped from $68.01 million in 1994 to $53.08 million in 1995, a decline of 22 percent. Decreased levels of logging-road construction in the Southeastern region and completion of road-repair projects in the Eastern Interior and Southcentral regions were responsible for most of the decline.

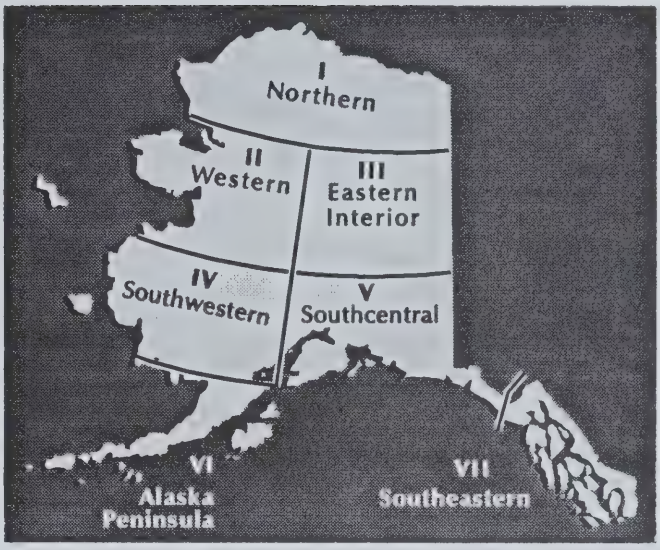


Figure 3. *Regions of mineral activity in Alaska as described in this report.*

GOVERNMENT ACTION

In June 1995, Alaska Governor Tony Knowles signed HB 197, a mining-incentive bill that provides 100 percent credit for exploration costs up to $20 million against future mining license and corporate taxes, and on state mineral production royalties.

The longstanding Alaska Mental Health Lands litigation, which halted leases and transfers of millions of acres of state-owned mineralized lands, reached an interim solution in January 1995.

The U.S. Bureau of Mines (USBM), which conducted applied minerals research in Alaska for more than 80 years, was dissolved by the U.S. Congress in October 1995. Some USBM staff were transferred to the U.S. Bureau of Land Management and may continue mineral assessments of federal lands.

The Alaska Department of Natural Resources presented reclamation awards to 10 placer operators and one hardrock mining company. Seven firms received recognition for excellent mine reclamation, while four firms received the distinguished Governor's Award for outstanding reclamation of mined lands. The State of Alaska will continue to present annual awards to mining companies for exemplary work in returning mined lands to useful condition.

ACKNOWLEDGMENTS

This report is designed, produced, and distributed by DGGS and the Division of Mining & Water Management (DMWM) in the Department of Natural Resources, and the Division of Trade and Development in the Department of Commerce and Economic Development. This report is published in the DGGS Special Report series and is available from the three participating agencies.

In December 1995 Tom Bundtzen and Joni Robinson of DGGS mailed approximately 985 questionnaires to mineral exploration companies, Native corporations, mine operators, and government agencies that oversee or regulate mining activity. A total of 153 questionnaires were completed and returned to DGGS. We sincerely thank all of the respondents, without whom this report would not be possible.

Tom Bundtzen wrote the Executive Summary, Development, Production, and Metal Recycling sections and updated Appendixes D (Selected significant mineral deposits and mineral districts in Alaska), F (Primary metals production in Alaska, 1880–1995), and G (Production of industrial minerals, coal, and other commodities in Alaska, 1880–1995). Dick Swainbank wrote the Exploration and Drilling sections and coauthored the Government Actions section with Mitch Henning. Joni Robinson updated Appendix C (State and federal agencies and private interest groups involved in mineral development activities). Erik Hansen and Denise Herzog-Cook updated Appendixes A (Total active claims and new claims staked in 1993, 1994, and 1995) and B (1994 Prospecting sites on state lands). Al Clough supplied mineral industry data for the Southeastern region. Kathy Charlie wrote the Mine Reclamation section.

On the production team Ann-Lillian Schell designed the cover, Greg Laird created the computer graphics, Fran Tannian edited the report, and Joni Robinson designed the publication and did the desktop publishing.

[6]Readjusted from the 137,342 ounces (4,271 kilograms) gold total published in DGGS Information Circular 41 (Bundtzen and others, 1996), because of newly acquired data.

EXPLORATION

Reported exploration expenditures for 1995 were $34.31 million, up 10 percent from the $31.10 million reported for the previous year.

Table 3 shows Alaskan exploration expenditures subdivided by principal commodities sought between 1982 and 1995. Base metals such as copper, nickel, lead, and zinc have become more attractive to exploration since 1993. However, the search for precious metals began to dominate Alaska's exploration industry in the last half of the 1980s and continues to do so today (fig. 4). Since the late 1980s, the Southeastern region has been the most prospected area in the state, followed closely by the Eastern Interior, Western, and Northern regions (table 4; fig. 5).

Table 5 is a summary of claim activity in Alaska from 1990 to 1995. Appendix A shows the activity by quadrangle, and Appendix B lists the number of prospecting sites.

Although a few more federal mining claims were staked in 1995 than in 1994, assessment was not performed for many existing claims, with the result that there were 694 fewer claims in 1995 than in 1994. There has been a 70 percent reduction in the number of active federal claims since 1990.

In contrast, many more state mining claims were staked in 1995 than in any year since 1988. However, there were 28 percent fewer total state claims in 1995 than in 1990.

Exploration highlights during 1995 were the discovery of a new orebody at the Red Dog Mine in the Northern region, renewed interest in the Eastern Interior region, a new copper-nickel discovery in the Alaska Range, and expansion of the reserve base at the Donlin Creek gold prospect in the Southwestern region.

NORTHERN REGION

Exploration expenditures in the Northern region for 1995 were reported to be $3.45 million, down slightly from the $4.04 million spent in 1994. This decline is due mainly to the lack of coal exploration in the region in 1995.

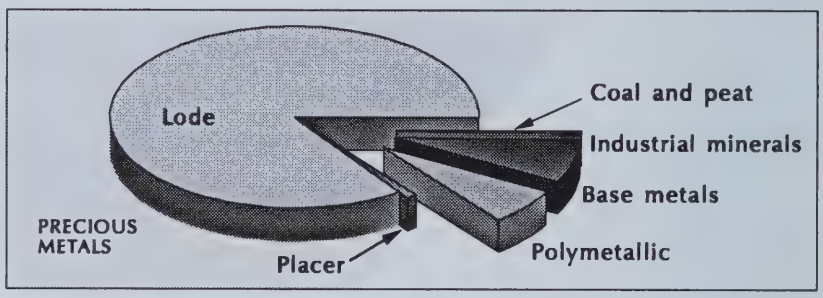


Figure 4. *Exploration expenditures by commodity grouping. The search for precious metals dominated exploration expenditures in 1995.*

Table 3. *Reported exploration expenditures in Alaska by commodity, 1982–95*

	Base metals	Polymetallic[a]	Precious metals	Industrial minerals	Coal and peat	Other	Years Total
1982	$31,757,900	N/A	$ 10,944,100	$ --	$ 2,900,000	$ 15,300	**$ 45,617,300**
1983	9,758,760	N/A	20,897,555	2,068,300	1,338,454	70,000	**34,133,069**
1984	4,720,596	N/A	14,948,554	270,000	2,065,000	279,500	**22,283,650**
1985	2,397,600	N/A	6,482,400	--	270,000	--	**9,150,000**
1986	1,847,660	N/A	6,107,084	170,000	790,000	--	**8,914,744**
1987	2,523,350	N/A	11,743,711	286,000	1,150,000	31,000	**15,734,061**
1988	1,208,000	N/A	41,370,600	160,200	2,730,000	--	**45,468,800**
1989	3,503,000	N/A	43,205,300	125,000	924,296	5,000	**47,762,596**
1990	5,282,200	N/A	57,185,394	370,000	321,000	97,000	**63,255,594**
1991	4,789,500	N/A	34,422,039	92,000	603,000	2,000	**39,908,539**
1992	1,116,000	3,560,000	25,083,000	25,000	425,000	--	**30,209,000**
1993	910,000	5,676,743	23,382,246	163,500	--	125,000	**30,257,489**
1994	600,000	8,099,054	18,815,560	225,000	2,554,000	810,000	**31,103,614**
1995	2,770,000	10,550,000	20,883,100	100,000	--	3,000	**34,306,100**
TOTAL	**$73,184,566**	**$27,885,797**	**$335,470,643**	**$4,055,000**	**$16,070,750**	**$1,437,800**	**$458,104,556**

[a]Polymetallic deposits considered as a separate category for the first time in 1992.
N/A = Not available.
-- Not reported.

Metals

Probably the most important exploration news in Alaska during 1995 was the discovery of a new orebody at the Red Dog Mine. Cominco Alaska Inc. has been studying the possibility of expanding the current operation, and searching for new reserves. On July 18, while investigating a mineral showing known as the North Extension 1,500 feet (1,000 meters) north of the main pit, a Cominco diamond drill intercepted 540 feet (165 meters) of 16.1 percent zinc, 3.2 percent lead, and 1.6 ounces per ton (54.9 gram per tonne) silver. By August, five drills were active and 124 holes were drilled for a total 56,398 feet (17,190 meters) of core.

Table 4. *Reported exploration expenditures and employment in Alaska by commodity and region, 1995*

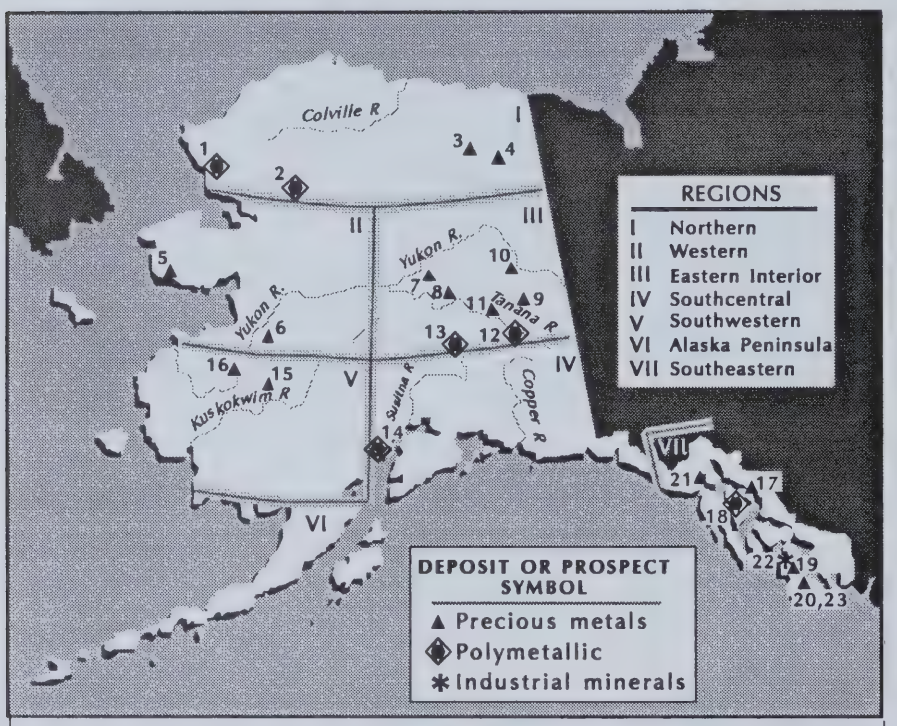
	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	Total
Exploration expenditures								
Base metals	2,450,000	--	--	100,000	100,000	--	120,000	**2,770,000**
Polymetallic[a]	625,000	1,645,000	2,750,000	700,000	360,000	--	4,470,000	**10,550,000**
Precious metals-								
Placer	376,000	255,000	236,100	30,000	76,000	--	111,000	**1,084,100**
Lode	--	2,805,000	7,592,000	72,000	1,815,000	--	7,515,000	**19,799,000**
Coal and peat	--	--	--	--	--	--	--	--
Industrial minerals	--	--	--	--	100,000	--	--	**100,000**
Other	--	--	--	--	--	--	3,000	**3,000**
TOTAL	**3,451,000**	**4,705,000**	**10,578,100**	**902,000**	**2,451,000**	--	**12,219,000**	**34,306,100**
Exploration employment								
Employment								
Workdays	3,962	9,330	9,243	670	4,902	--	15,951	**44,058**
Workyears[b]	15	36	36	3	19	--	61	**169**[c]
Number of companies reporting[d]	7	6	30	12	7	--	10	**72**

-- No expenditures reported.
[a]Jade, platinum, gemstones.
[b]Based on 260-day workyear.
[c]Small discrepancy on total due to rounding.
[d]Some companies active in more than one area.

Table 5. *Summary of claim activity, 1989–95*

Year	1989	1990	1991	1992	1993	1994	1995
New claims							
State	3,928	2,573	3,391	2,606	2,042	3,365	4,889
Federal	1,562	1,888	1,299	695	601	341	376
Subtotal	**5,490**	**4,461**	**4,690**	**3,301**	**2,643**	**3,706**	**5,265**
Active claim assessment							
State	N/A	32,275	29,754	26,615	25,684	22,601	20,217
Federal	N/A	25,792	23,222	20,254	9,298	8,495	7,766
Subtotal	**64,225**	**58,067**	**52,976**	**46,869**	**34,982**	**31,096**	**27,983**
Total state	N/A	34,848	33,145	29,221	27,726	25,966	25,106
Total federal	N/A	27,680	24,521	20,949	9,899	8,836	8,142
TOTAL	**69,715**	**62,528**	**57,666**	**50,170**	**37,625**	**34,802**	**33,248**

N/A = Not available.



I Northern Region

1. Red Dog Mine—Cominco Alaska Inc.
2. Ambler Mineral Belt—Kennecott Exploration, Teck Exploration
3. Wiseman Area—Silverado Mines (U.S.) Inc.
4. Chandalar Lake—Hamlyn Estates

II Western Region

5. Nome Area—Kennecott Exploration, Cominco Alaska Inc.
6. Illinois Creek—USMX Inc.

III Eastern Interior Region

7. Sawtooth Mountain—ASA/ Montague J-V
8. Fairbanks district
   a. True North—Newmont Exploration
   b. Fort Knox—Fairbanks Gold Mining Inc.
   c. Ester Dome—Silverado Mines (U.S.) Inc.
   d. General—Amax Gold Exploration, Placer Dome U.S. Inc.
9. Stoneboy—WGM/Sumitomo
10. Circle district—Alpine Exploration Inc.
11. Richardson district—Tri-Valley Corp.
12. Tok area—American Copper and Nickel Co. (ACNC)
13. Nikolai—ACNC

IV Southcentral Region

14. Johnson River—Westmin Resources Ltd.

V Southwestern Region

15. Donlin Creek—Placer Dome U.S. Inc.
16. Stuyahok—Calista Corp.

VI Alaska Peninsula Region

VII Southeastern Region

17. Alaska-Juneau—Echo Bay Mines Alaska Inc.
18. Greens Creek—Kennecott Greens Creek Mining Co.
19. Hetta Inlet—American Copper and Nickel Co.
20. Dolomi—Sealaska Corp.
21. Dream—Henkins/Eichman
22. Calder Bay—Sealaska
23. Niblack—Abacus Minerals Inc.

Figure 5. *Selected exploration projects in Alaska, 1995.*

By the end of 1995 the inferred reserves of this new orebody, called the Aqqaluk deposit, stood at 83.8 million tons (76 million tonnes) containing 13.7 percent zinc, 3.6 percent lead, and 1.9 ounces per ton (66 grams per tonne) silver. The Red Dog Main Deposit holds indicated reserves of 57.5 million tons (52.2 million tonnes) grading 19.5 percent zinc, 5.3 percent lead, and 2.9 ounces per ton (100 grams per tonne) silver. The nearby Hilltop Deposit contains an additional probable resource of 15.6 million tons (14.1 million tonnes) with grades below that of the Main and Aqqaluk deposits.

Red Dog is a Mississippian to Permian massive sulfide deposit located in the western Brooks Range (Moore and others, 1986). According to Kulas (1995), the deposit is interpreted to be a shale-hosted sedimentary exhalative (sedex) deposit. An extensive vein system cuts the footwall and the exhalite package. However, Red Dog ore contains unusual silicification and extensive replacement texture not normally associated with sedex deposits.

The lowest plate, which is thrust-fault bounded, is folded into a syncline, and the Aqqaluk deposit is thickest near the axis of the syncline. For example, hole 546, which is proximal to the axis of the syncline, contains 570 feet (174 meters) averaging 19.8 percent zinc, 3.7 percent lead, and 1.9 ounces per ton silver (65 grams per tonne). The geometry of the ore zone is lenticular and is structurally thinned in all directions except to the west where a facies change between exhalite and unmineralized host rocks is

evident. The older Kivalina Member of the Kuna Formation is commonly preserved above the basal thrust and is the immediate footwall to the deposit.

Although thicker and of somewhat lower grade, the Aqqaluk deposit ore is similar to that being mined in the Main Deposit. Sphalerite and galena occur in silica rock, barite rock, and the host shale (Ikalukrok Member, Kuna Formation). Sulfides are disseminated, semi-massive to massive, and rarely laminated. Late cross-cutting sulfide veins and stringers occur in the host shale and to a lesser extent in the exhalite package. Iron sulfide occurs as disseminations, masses, and veins, especially near the western edge. The overall iron content is 8 percent. Angular breccias are common. Typically, they are sharply contacted shale clasts in a sulfide matrix; fragments of sulfide and exhalite rock may also occur. Vent fauna (fossil remains of worms and other invertebrates) are present and are commonly preserved through replacement by sulfides or silica in the Aqqaluk deposit.

The airstrip at Bornite in the Kobuk Valley was used as the base of operations for two exploration camps in the Ambler copper belt. Kennecott conducted geophysical surveys in the vicinity of the Bornite deposit and near the Arctic camp. Teck Exploration continued work on the massive sulfide prospects it staked in 1994.

Amigaq Copper Mine Inc., based in Noorvik, continued a multi-year exploration program in the Squirrel River drainage northwest of Bornite.

The Chandalar Lake area was also active in 1995, with several dozens of new claims staked during the winter by Hamlyn Estates Inc.

Silverado Mines (U.S.) Inc. continued exploration of both the placer and hardrock targets in the valley of Nolan Creek near Wiseman in the Brooks Range. In late August Silverado announced that drilling on the Slisco Bench in the Hammond River Valley had found grades of up to 0.3 ounces per cubic yard (12.2 grams per cubic meter) in a deep channel several hundred feet above the present river. More than 5,000 feet (1,524 meters) in 65 holes of reverse-circulation drilling was completed on the Bench.

Mitch Fleming reported some exploration work on Myrtle Creek in the Wiseman area.

WESTERN REGION

Exploration investment declined in 1995 to $4.71 million from the $6.53 million reported in 1994. Activities by Nixon Fork Mining Co. shifted from exploration in 1994 to development in 1995.

Metals

Alaska Gold Co. had a small exploration drilling program in conjunction with development and mining of its open-pit operation. Steve Pomrenke spent part of the summer exploring for placer gold at Tripple Creek just east of Nome. Tolstoi Mining Co. (Doug Sherrer) reported some exploration on Boob Creek, west of Ophir.

Kennecott Exploration Inc. has an exploration agreement with Golden Glacier Inc., wholly owned by the Bering Straits Native Corp. (BSNC) and with Alaska Gold Co. to explore and develop a larger than 10,000-acre (4,000-hectare) tract north of Nome. This is the same tract previously explored by Placer Dome U.S. Inc., Tenneco Minerals, and Newmont Exploration Ltd. from 1987 to 1992. Kennecott deployed a crew of 24 throughout the season, with 60 percent of the total being shareholders in BSNC.

In the Rock Creek tract Kennecott had a large drilling and trenching program and completed more than 50 line-miles (80 line-kilometers) of ground magnetic survey (fig. 6). Some of the drilling was designed to better understand the nugget effect at the Rock Creek deposit, which by the end of 1995 had a drill-inferred resource of 10 million tons at 0.071 ounce per ton (9 million tonnes at 2.44 grams per tonne) of gold. Several large targets with geologic similarities to the Rock Creek deposit remain to be tested.

Kennecott also explored a 19,280 acre (7,800 hectare) tract known as the Aurora Creek project west of the Snake River. The Aurora Creek mineral zones consist of a series of zinc-lead-barite-gold massive sulfide deposits that occur along a strike length of 4 miles (6.4 kilometers). Surface rights belong to Sitnasuak, the local village corporation, and the subsurface rights belong to the regional corporation, BSNC. Work consisted of a diamond-drill program, 20.8 miles (33 kilometers) of ground magnetic survey, and soil sampling.

Kennecott also operated a small exploration program at Mt. Distin, north of Nome, on a 6,000 acre (2,428 hectare) tract leased from Golden Glacier Inc. The methods used and the personnel were the same as for the Aurora Creek and Rock Creek projects.

In a project at Deering, on the north coast of the Seward Peninsula, Kennecott Exploration joint-ventured with the NANA Regional Corp. to do geophysical exploration for polymetallic and base metal deposits.

Cominco Alaska Exploration Inc. staked a large block of claims in the Stewart River drainage north of Mt. Distin, near Nome, where high grade mesothermal quartz-carbonate-gold veins were discovered.

Northwest Land Resources and Rosander Mining Inc. conducted a small exploration program in search of precious metal lode deposits at Colorado Creek north of McGrath.

Beginning in January, USMX held a number of meetings with various state and federal agencies to scope out the possible problems associated with mining

Figure 6. *Through an exploration agreement with Bering Straits Native Corp. and Alaska Gold Co., Kennecott Exploration Inc. operates a winter drilling program at the Rock Creek mineralized area 10 miles (16 kilometers) north of Nome. Exploration through 1995 has delineated an inferred reserve of 10 million tons of 0.071 ounces per ton (9 million tonnes of 2.44 grams per tonne) at the main Rock Creek deposit. Photo by Nick Enos, Kennecott Exploration Inc.*

and reclamation of its proposed heap-leach operation at the Illinois Creek deposit. An agreement had been signed with the owner North Pacific Mining Co. which allowed USMX to acquire majority control of the operation. USMX had an active exploration program at Illinois Creek during the 1995 season with over 16,000 feet (4,878 meters) of reverse circulation drilling, and almost 8,000 feet (2,440 meters) of diamond drilling, with one hole intercepting 35 feet (10.7 meters) of 0.88 ounces of gold per ton (30.19 grams per ton). The company intends to use a C-133 aircraft to mobilize some of the larger equipment, and sought FAA's special permission to use the plane because this type of aircraft has never been certified for civilian use.

Exploration continued at Nevada Goldfields Inc.'s Nixon Fork gold-copper mine concurrent with mine development. In mid-December the company finalized an agreement to lease 46,000 acres (18,616 hectares) of private land near the mine from the Doyon Ltd. Native Regional Corp. for $4 million. The company plans to spend about $2 million in exploration during 1996.

EASTERN INTERIOR REGION

Reported exploration investment in the Eastern Interior was $10.58 million in 1995, an increase of 30 percent over the $8.15 million reported the previous year. Precious metal targets accounted for most of the exploration.

The Division of Geological & Geophysical Surveys contracted WGM Inc. and Dighem Surveys and Processing Inc. to fly about 687 square miles (1,779 square kilometers) of airborne magnetic and electromagnetic survey in the Hot Springs–Rampart area about 80 miles (128 kilometers) west-northwest of Fairbanks. The survey results were released on March 4, 1996 (Alaska Division of Geological & Geophysical Surveys, 1996). The 1995 survey cost about $408 per square mile ($157 per square kilometer), the 1994 survey of the Fairbanks and Richardson districts cost about $487 per square mile ($188 per square kilometer), and the 1993 survey of the Nome, Nyac, Circle, and Valdez Creek areas cost $684 per square mile ($264 per square kilometer).

Metals

American Smelting and Refining Co. contracted with local consultants to acquire prospects in the Manley Hot Springs area in anticipation of the results of the airborne geophysical survey.

During the winter of 1994–95 several hundred new mining claims and prospecting sites were staked in the Fairbanks district. Three probable factors responsible for this increased activity were (1) the successful exploration program at the True North prospect, (2) the development of the Fort Knox Gold Mine, and (3) the airborne geophysical survey flown by the Division of Geological & Geophysical Surveys in 1994. The major participants were Newmont Exploration Ltd., La Teko Resources Ltd., Placer Dome U.S. Inc., Fairbanks Gold Mining Inc., and Silverado Mines (U.S.) Inc.

At the Fort Knox Mine, which has reserves of 175 million tons of 0.024 ounces per ton gold (159 million tonnes at 0.82 grams per tonne), most of the 1995 activity was in mine development, but mine operator Fairbanks Gold Mining Inc. also staked a large group of claims to consolidate its holdings in the vicinity. The company also drilled the Gil East prospect about 6 miles (9 kilometers) northeast of the Fort Knox Mine. This

prospect has a geochemical signature similar to the Fort Knox deposit, but is in metamorphic rocks rather than in granite, and contains more arsenic. Many of the drill intercepts averaged about 50 feet of about 0.03–0.04 ounces per ton (15.4 meters of 1.0–1.4 grams per tonne). However, one contained 130 feet of 0.11 ounces per ton (42.7 meters of 3.77 grams per tonne), and visible gold was reported in several intercepts.

Cyprus Amax Minerals Co. conducted a limited exploration program in the Fairbanks area and elsewhere in interior Alaska in 1995. One small program was in the westernmost part of the Fairbanks district, partly on claims owned by Roger McPherson, which he has prospected for several years, and partly on ground staked by Cyprus Amax the previous winter. A mineralized calc-alkalic pluton occurs near McPherson's claims between Any Creek and Our Creek.

Coromandel Mining Co. had a full summer of exploration of its claims on Bear Creek north of the Fort Knox Mine.

The True North property is located about 15 miles (24 kilometers) north of Fairbanks, and about 8 miles (12.8 kilometers) west-northwest of the Fort Knox Mine. True North is hosted in the Chatanika Terrane, a thick sequence of coarse-grained mica schists, carbonaceous quartzites, amphibolites, and calcareous pyroxene-rich rocks which have been subjected to eclogite facies regional metamorphism. The Chatanika Terrane was thought to have little potential for hosting large tonnage, low-grade gold deposits until the delineation of the True North deposit. At the end of 1994, reserves in two discrete deposits at the True North property, the Shepard and Hindenburg, stood at 446,000 ounces (13,872 kilograms) of gold.

The property is currently being explored by Newmont Mining Co. under the terms of a joint venture negotiated between Newmont and La Teko Resources. Newmont began work on True North in June with trenching and reverse circulation drilling, followed later in the season by core drilling. Through the 1995 season about 15,000 feet (4,572 meters) of reverse-circulation drilling, about 13,000 feet (3,962 meters) of core-drilling, and about 6,300 feet (1,920 meters) of trenching were conducted on the property. Results of this work indicated the Shepard and Hindenburg prospects are part of a larger 5,200 x 2,600 foot (1,585 x 793 meter) zone of continuous mineralization.

Exploration concluded by October of 1995 had yet to define the ultimate limits of the True North mineralization. One drill hole, TN315, intercepted 35 feet of 1.22 ounces of gold per ton (10.7 meters of 41.9 grams per tonne). At the end of 1995, Newmont made a $1 million payment to La Teko as part of the buy-in agreement whereby Newmont can earn up to a 65 percent interest in the property.

During the 1994-95 winter Placer Dome U.S. Inc. began staking prospecting sites east and south of the True North property and drilled out 5,094 feet (1,553 meters) of core (fig. 7). The purpose of the drilling was to investigate the relationship between the Chatanika Terrane rocks and the Fairbanks schist to the southeast. The prospecting sites were converted to claims in May, and during the summer Placer Dome conducted a close-spaced airborne geophysical survey. The company also flew a 110 square mile (285 square kilometer) airborne survey near Livengood, about 80 miles (128 kilometers) north of Fairbanks and optioned ground held by Alaska Placer Development Inc. as part of a sub-regional exploration program.

Figure 7. *A winter drilling program conducted by Placer Dome Inc. in the Fairbanks district. The drill stem is protected from inclement weather and from freezing by customized tarps that are manufactured by Alaska Tent and Tarp Inc. of Fairbanks. Photo by Curt Freeman.*

Silverado Mines (U.S.) Inc. acquired a large group of claims called the Marshall Dome prospect (formerly the Golden Slipper group) south of the Placer Dome holdings, and continued exploration through freeze-up. Silverado had earlier added about 5 square miles (12.5 square kilometers) of claims to its holdings on Ester Dome, west of Fairbanks, and throughout the summer and fall continued ground geophysical surveys and soil-sampling.

La Teko Resources announced in March that it had staked 16,000 acres (6,475 hectares) in the Juniper Creek area, which is underlain by the Chatanika Terrane. The Juniper Creek area exhibits conductivity responses that are similar to that of the True North property. The conductivity response data has been published on geophysical survey maps by DGGS (1995a and 1995b). One mineralized sample from the Juniper Creek prospect assayed 0.247 ounces per ton (8.5 grams per tonne) of gold. During the summer field season, La Teko found several stream sediment and soil gold anomalies in the area and will continue to explore the Juniper Creek prospect in 1996.

On August 31 La Teko announced that it optioned the Ryan Lode Mine to a joint venture between KLS Enviro Resources Inc. and Nevada Star Resources Corp. The option provided 90 days to fund and complete a pre-feasibility study.

Avalon Development Corp. drilled about 10,000 feet (3,048 meters) in altered granodiorite known as the Dolphin Prospect on a ridge between the Tolovana and Cleary Hill mines in the Fairbanks district (fig. 8). The intrusion contains abundant veinlets of arsenopyrite and pyrite. The first phase of drilling had several interesting intercepts, including 330 feet of 0.049 ounces of gold per ton (100 meters of 1.68 grams per tonne) in the discovery hole, and 90 feet of 0.067 ounces per ton (27 meters of 2.3 grams per tonne) of gold in another. The second phase of drilling in the late fall entailed 5,294 feet (1,614 meters) in 15 drill holes, and showed that the Dolphin intrusion is 1,200 feet (366 meters) wide and the east-west strike is at least 1,600 feet (488 meters). The drill program found anomalous molybdenum deeper in the intrusion that may signify a higher temperature portion of the hydrothermal system. Anomalous arsenic, lead, zinc, tungsten, and bismuth are associated with pervasive flood silicification, sericitic alteration, and carbonate flooding. Visible gold in the drill cuttings from one hole suggest that metallic screen analyses may be needed.

For the first time in several years hardrock drilling was reported in the Circle district 100 miles (160 kilometers) northeast of Fairbanks. One target was on the Joker and 88 claims, an area of gold-bearing quartz stringers within an altered granite a few miles south of Circle Hot Springs. On another site in Gold Dust Creek, Alpine Exploration Co. used reverse circulation drilling to about 1,400 feet (427 meters) to explore veins found during earlier placer mining.

Tri-Valley Corp. continued exploration of its holdings in the Richardson mining district about 50 miles (80 kilometers) southeast of Fairbanks.

Approximately 120 miles (192 kilometers) southeast of Fairbanks, the WGM-Sumitomo Metal Mining Co. (Sumitomo) joint venture core-drilled 13,000 feet (3,962 meters) and ran about 40 line-miles (64 kilometers) of an induced polarization (I.P.) survey at the Pogo prospect within the Stone Boy joint-venture exploration area. Sumitomo announced that 9 of 13 holes found gold mineralization and that the Pogo prospect, which is on land owned and managed by the State of Alaska, has high potential for development. One hole contained 630 feet of 0.032 ounces gold per ton (192 meters of 1.1 grams per tonne) from the surface to depth. Hole 7 contained 27 feet of 0.32 ounces per ton (8.2 meters of 11 grams per tonne) at a

Figure 8. *Avalon Development Corp. drilled about 10,000 feet (3,048 meters) at the Dolphin Prospect near the old Cleary Hill mine in the Fairbanks district, Eastern Interior region. The gold-arsenic mineralization occurs in an altered intrusion. Photo by Curt Freeman.*

depth of 684 feet (208 meters) and hole 9 had 22.6 feet of 1.84 ounces per ton gold (6.9 meters of 63.1 grams per tonne) at a depth of 600 feet (183 meters).

American Copper & Nickel Co. (ACNC) carried out a vigorous exploration program in the eastern Alaska Range in the Tok mining district. Exploration firms have referred to the project area as the Delta Mineral Belt. It contains numerous polymetallic massive sulfide prospects. ACNC contracted for an airborne geophysical survey to help the exploration effort. Late in the year ACNC staked a very large block of Alaska state mining claims that covered about 60 square miles (155 square kilometers) west of Paxson where abundant mafic and ultramafic rocks are thought to be the source of many copper, nickel, and platinum anomalies. Paxson is about 80 miles (128 kilometers) south of Delta Junction.

ASA had a modest exploration program in the area west of Livengood. Several of the placer mines throughout the Interior region reported exploration activities.

The most intensive placer exploration was carried out by Polar Mining with a large drill program near Fox, about 10 miles (16 kilometers) north of Fairbanks. Herning Exploration & Development reported exploration on Palmer Creek, 64 miles (102 kilometers) east of Fairbanks. Busby Mining had a modest drill program at Chicken. Bonanza Creek Mining Co. reported exploration on Bonanza Creek in the Circle district.

Kelley Mining Co. did some backhoe pitting on North Fork Creek in the Eureka area near Manley. Ed Salter of Salter & Associates did a little trenching on Joe Bush Creek. Michael Stormont reported mapping on the Idaho Bar area near the village of Rampart.

SOUTHCENTRAL REGION

Exploration investment in southcentral Alaska in 1995 was reported to be $902,000, down substantially from the $1.57 million spent during the previous year.

Metals

The largest program in the Southcentral region was the continued exploration and geotechnical drilling by Westmin Resources Ltd. at the Johnson River prospect on the west side of Cook Inlet. Westmin also explored geophysical anomalies in the area.

Hemlo Gold Mines (USA) Inc. began an exploration program at Gold Hill in the Valdez Creek area and intends to continue the work in 1996. Bob Fithian of Alaska Hardrock Inc. spent a few days mapping and sampling hardrock properties in the Willow Creek district.

Addwest Minerals Ltd. continued follow-up work at the Golden Zone copper-gold-arsenic deposit in the Chulitna River area southwest of Cantwell. Based on an extensive diamond-drill program conducted mainly in 1994, Addwest estimates that the Pipe, Bunkhouse, and Copper King skarn deposits contain a collected inferred reserve of 13.3 million tons (12.1 million tonnes) grading 0.095 ounces per ton (3.26 grams per tonne) gold with credits for copper.

Minor exploration programs were reported at several placer mines in the Petersville-Collinsville area, at Girdwood, and in the Palmer area. Ed Ellis of Lake Creek Placers continued prospecting Lake and Independence Creeks in the Yentna district for gold and platinum-group elements; Mrak Placer Mine reported sampling on Willow Creek. John Trautner of Outsider Mining did some bulk sampling of his Canyon Creek claims on the Kenai Peninsula. Jim Halloran of Orofino Mining & Exploration Co. continued prospecting in the Kahiltna-Yentna River area. Howard Hunt of H & H Exploration & Mining explored the Collinsville area. Arnold Echola reported prospecting in the Gold Creek area off the Susitna River. Camden Toohey spent part of the season prospecting on Crow Creek near Girdwood. Arctic Knights Mining Co. was active along the coast near Yakutat.

Coal

In May 1995, North Pacific Mining Inc. announced that it would take over the lease on the Wishbone Hill coal mine from Idemitsu-Alaska for an undisclosed compensation. This state coal lease contains about 15 million tons (13.6 million tonnes) of minable high-quality bituminous coal in the Matanuska Coalfield near Palmer, about 40 miles (64 kilometers) northeast of Anchorage.

Late in the year Nerox Power Systems Inc. announced that it will enter into a joint venture with Hobbs Industries to develop the Evan Jones Mine in the same coalfield, with the intent of selling the coal to Glencore Ltd., an international brokerage company.

The recent increased interest in Alaska coal is due to the rise in the international benchmark price for coal, coupled with the forecast of increasing demand for coal in the Pacific Rim.

SOUTHWESTERN REGION

Exploration expenditures in southwest Alaska in 1995 were $2.45 million, more than three times those of the previous year, due mainly to the activity of Placer Dome U.S. Inc.

Metals

In June 1995, Placer Dome U.S. Inc. announced that it would mount a $1 million exploration program on Calista Corp. lands at Donlin Creek about 15 miles

(24 kilometers) north of Crooked Creek on the Kuskokwim River. Placer Dome began an aggressive 17,000 foot (5,181 meter) core-drilling program, and started construction of an airstrip suitable for C-130 Hercules aircraft late in the year, with plans to continue the program in 1996.

Donlin Creek is one of a series of prospects associated with 60- to 70-million-year-old felsic dikes and sills intruded into Cretaceous flysch within a 500-mile (805-kilometer) belt through the Kuskokwim Mountains and, possibly, into the Livengood area. Gold is associated with arsenic, antimony, and mercury sulfides within and near small felsic intrusives. Previous work by Westgold Inc. at Donlin Creek indicated an inferred reserve of about 380,000 ounces (11,819 kilograms) of gold with grades of about 0.088 ounces per ton (3.02 grams per tonne).

Calista Corp. continued an exploration project seeking gold in the Stuyahok area in close cooperation with minerals research conducted by the U.S. Geological Survey. Paul Sayer of Little Creek Mine continued to prospect on Little Creek and Bedrock Creek near Ophir.

John Miscovich of Misco-Walsh Mining Co. took a bulk sample from the Golden Horn Mine in the Iditarod district. This igneous-hosted stockwork and vein deposit contains gold, silver, and tungsten.

Industrial Minerals

Bristol Bay Native Corp. spent several days prospecting for sand and gravel deposits in the Dillingham and South Naknek areas for use in local road construction.

SOUTHEASTERN REGION

As in the past few years, there was more exploration reported in southeastern Alaska than any other part of the state. The $12.22 million invested in 1995 was up substantially from the $10.05 million invested in 1994. Most of the activity was at the A-J, Kensington, and Greens Creek Mines near Juneau. In addition, American Copper & Nickel, Abacus Minerals, and Sealaska had active programs on Prince of Wales Island in southern southeast Alaska.

Metals

Echo Bay Alaska Mines Inc. undertook a major reassessment of the A-J project throughout much of 1995. This followed detailed geologic and engineering investigations, and reanalysis of the ore deposit, combined with difficulties encountered in permitting the original mining proposal. The process will continue in 1996.

Based upon the newly-developed data, Echo Bay has announced a draft revised mine plan. The original plan called for using large open stopes and mining 22,500 tons (20,400 tonnes) per day. The draft of the revised plan calls for using sub-level caving, a more selective mining method, at a rate of 15,000 tons (13,600 tonnes) per day. These changes are the result of a more complete understanding of the ore deposit geometry and economic potential. The draft revised plan also calls for the removal of the cyanide circuit from the mill flowsheet, with most of the gold reported to the gravity circuit. The flotation concentrate will be shipped offsite for beneficiation.

Greens Creek is a zinc-silver-gold-lead mine hosted in a volcanogenic massive sulfide deposit on Admirality Island about 20 miles (32 kilometers) west of Juneau. Current reserves are listed at 8.66 million dry short tons of 0.169 ounces per ton gold, 20.26 ounces per ton silver (7.85 million tonnes at 5.8 grams per tonne gold, 695 grams per tonne silver), 13.91 percent zinc, and 5.06 percent lead. The majority owner and operator of the mine is Kennecott. Minority parties are Hecla Mining Co. and Exalas Resources Co. The mine went into production in 1989, but due to low metal prices was shut down in 1993. After the closing about 30 people were employed to delineate and explore the newly discovered Southwest Extension orebody.

In 1995, Echo Bay Alaska Inc. and Coeur Alaska dissolved their 50-50 joint venture at the Kensington Mine. Coeur paid $32.50 million, plus a scaled royalty on the first 1 million ounces (31,100 kilograms) of gold production, to secure 100 percent ownership. The Kensington project, as defined by Coeur, contains over 1.96 million ounces (60,963 kilograms) of gold in the proven and probable categories. Mine-life is expected to be 12 years, with a workforce of 250 mining at a rate of 4,000 tons (3,628 tonnes) per day by long-hole open-stoping. Workers will rotate through an on-site camp, with access to Juneau via helicopter. Annual production is expected to be 259,000 ounces (8,056 kilograms) gold. Ore will be beneficiated by flotation augmented by carbon-in-leach processing. Tailings will be contained in the valley of Sherman Creek, which will be diverted to ensure the integrity of the impoundment, and treated effluent will be returned to the creek below the dam.

Abacus Minerals Corp. and Pamicon conducted a major exploration program at the Niblack massive sulfide deposit on Prince of Wales Island. The property was acquired from Noranda Exploration and Lac Minerals after the takeover by Barrick Gold. The property, which is rich in gold and copper, is a volcanogenic massive sulfide deposit that was discovered in 1899 and from which 20,000 tons (18,140 tonnes) were mined out of five levels between 1903 and 1908. Cominco explored the area and drilled several holes in the early 1970s, and Anaconda staked a

large claim group in 1977. This was subsequently optioned to Noranda, and in turn to Lac Minerals.

Abacus defined five target areas on the property, and has conducted geologic mapping, geochemical sampling, geophysical surveys, and dug several trenches near the old workings. A 13,000 foot (3,962 meter) diamond-drill program was completed in 1995. Work concentrated on a near-surface zone of pyrite-rich crystal tuffs called the Gold Zone. Drilling cut an oxide zone from 28 to 88 feet (8.5 to 26.8 meters) below surface, followed by 104 feet (31.7 meters) of base metal-rich massive sulfides. The whole 164 foot (50 meter) intercept ran 0.11 ounces per ton (3.77 grams per tonne) gold, 1.31 ounces per ton (45 grams per tonne) silver, 0.41 percent copper, and 1.09 percent zinc. Several other holes returned good gold values over significant widths. This new zone is similar to the Lookout zone on the same property.

Based on the drill results and the possibility of finding additional mineralization, Abacus formed a partnership with Teck Corp., which allows Teck to earn a 51 percent interest by completing a positive feasibility study and putting the property into production. The plans for 1996 include drilling another 20,000 feet (6,096 meters) to test areas of known mineralization and several geophysical anomalies.

American Copper and Nickel Co. continued an exploration program with ground geophysics, mapping, sampling, and 2,434 feet (742 meters) of diamond drilling at Hetta Inlet on Prince of Wales Island. This work, performed under an agreement with Sealaska Corp. was designed to test several polymetallic massive sulfide deposits in the Precambrian to Cambrian Wales Group.

Sealaska Corp. also funded a major program that included 2,400 feet (731 meters) of diamond-drilling on Kuiu Island investigating zinc-lead-silver deposits.

Grassroots exploration and selected project work for gold and polymetallic deposits continued at the Gold Fork prospect and at other sites in the Juneau Gold Belt, on northern Admirality Island at the Alaska-Dano claims, on Chichagof Island at the East Point claims, and near the Canadian border north of Haines.

John Schnabel of Big Nugget Mining Co. conducted modest exploration on his Porcupine Creek placer property near Haines. Earl Foster completed a magnetometer survey on his claims in the same drainage.

Jerry Fabrizio and his partners in Snow Lion Mining Co. have been able to expand their operation now that there is a partial settlement of the Mental Health Lands Trust issue, and are encouraged by the results of the 1995 exploration.

Industrial Minerals

Exploration and development of industrial mineral deposits on Sealaska land on Prince of Wales Island continued through 1995, and a deposit of chemical-grade limestone has been blocked out. Sealaska drilled out 4,076 feet (1,243 meters) of core in 1995.

DEVELOPMENT

Alaska mineral development expenditures totaled $148.58 million in 1995, compared with $44.94 million in 1994, a 234 percent increase (tables 5, 6, and 7). Mine construction at the Red Dog mine, and at the Nixon Fork and Fort Knox gold projects accounted for 86 percent of the 1995 statewide total development expenditure (fig. 9).

NORTHERN REGION

Metals

At the Red Dog mine Cominco Alaska completed a major mill-upgrade program that began in 1993. Capital expenditures at Red Dog during 1995 totaled $11.20 million and included installation of (1) a 1.2 million gallon fuel tank at the port, (2) a new lead flotation column, (3) two new zinc flotation columns, (4) an extension of the Red Dog Creek diversion, and (5) a modification to the tailings disposal line. As a result of these improvements, concentrate production from the mill increased by 14 percent from 1994 to 1995.

WESTERN REGION

Metals

Alaska Gold Co. reported large expenditures for development stripping of new opencut placer-mine pits, which are replacing the bucket-line dredging units in the Cape Nome district.

Nixon Fork Mining Co., the operating subsidiary for Consolidated Nevada Goldfields Inc., brought the Nixon Fork gold-copper mine 20 miles (32 kilometers) northeast of McGrath into production in October 1995 (fig. 10). Mine construction activities included (1) installation of a new runway capable of landing Boeing 737 aircraft, (2) construction of tailings dam and water containment system, (3) completion of a 165 ton per day (149 tonne per day) ball mill, (4) completion of a 50-person camp

Table 6. *Reported mineral development expenditures in Alaska by commodity, 1982–95*

	Base metals	Polymetallics	Precious metals	Industrial minerals	Coal and peat	TOTAL
1982	$ 10,270,000	N/A	$ 19,320,000	$ 4,251,000	$ 7,750,000	**$ 41,591,000**
1983	19,500,000	N/A	7,112,500	1,000,000	250,000	**27,862,500**
1984	10,710,500	N/A	15,058,555	579,000	27,000,000	**53,348,055**
1985	13,000,000	N/A	16,890,755	1,830,000	2,400,000	**34,120,755**
1986	3,260,800	8,000,000	12,417,172	124,000	530,000	**24,331,972**
1987	38,080,000	48,000,000	13,640,848	188,000	342,000	**100,250,848**
1988	165,500,000	69,000,000	40,445,400	- -	- -	**274,945,400**
1989	118,200,000	411,000	6,465,350	7,000,000	2,196,000	**134,272,350**
1990	- -	4,101,000	7,136,500	30,000	3,079,000	**14,346,500**
1991	- -	8,000,000	14,994,350	262,000	2,318,000	**25,574,350**
1992	80,000	4,300,000	23,151,300	404,000	1,655,000	**29,590,300**
1993	- -	10,731,136	15,103,000	433,500	1,400,000	**27,667,636**
1994	10,000,000	5,000,000	27,392,850	5,000	2,545,000	**44,942,850**
1995	11,200,000	9,590,000	127,165,750	426,000	200,000	**148,581,750**
TOTAL	**$399,801,300**	**$167,133,136**	**$346,294,330**	**$16,532,500**	**$51,665,000**	**$981,426,266**

N/A = Figures not available prior to 1986.
- - Not reported.

Table 7. *Reported mineral development expenditures and employment in Alaska, 1995*

	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	Total
				Development expenditures				
Base metals	$11,200,000	- -	- -	- -	- -	- -	- -	**$11,200,000**
Polymetallic	- -	- -	- -	- -	- -	- -	9,590,000	**9,590,000**
Precious metals								
Placer	- -	50,000	1,086,000	98,750	38,000	- -	53,000	**1,325,750**
Lode	- -	13,540,000	103,300,000	- -	- -	- -	9,000,000	**125,840,000**
Coal and peat	- -	- -	200,000	- -	- -	- -	- -	**200,000**
Industrial minerals	- -	- -	25,000	20,000	- -	10,000	371,000	**426,000**
TOTAL	**$11,200,000**	**$13,590,000**	**$104,611,000**	**$118,750**	**$38,000**	**$10,000**	**$19,014,000**	**$148,581,750**
				Development employment				
Employment								
Workdays	12,400	8,608	121,545	567	121	150	22,246	**165,637**
Workyears[a]	48	33	467	2	0.5	0.5	86	**637**
Number of companies reporting[b]	1	2	16	6	2	1	5	**33**

- - Not reported.
[a]Based on 260-day workyear.
[b]Some companies were active in several areas.

facility, and (5) preparation of underground stopes for mine production. Mine components were flown to the site in 75 trips on a L100C-130 Hercules aircraft.

The mill commenced operations on October 1, and direct mine feed was produced on October 6. The first dore bar was poured at the mine site on October 22. During November the mine produced 4,500 ounces gold (140 kilograms) and shipped to Kosaka, Japan, 22 tons (20 tonnes) of sulfide concentrates that assayed 33 ounces per ton (1,130 grams per tonne) gold and 6 percent copper. Concentrate shipments will continue biweekly.

Actual project costs were approximately 1 percent over a projected budget of $13.35 million. Alaska-based

subcontractors working on the Nixon Fork project included Wilder Construction, Golder and Associates, Lyntech Services, and Arctic Catering.

USMX, operator of the Illinois Creek heap leach gold project about 60 miles (90 kilometers) south-southwest of Galena, drilled several wells for hydrological baseline studies and constructed a new access road linking the proposed pit with the airstrip and campsite.

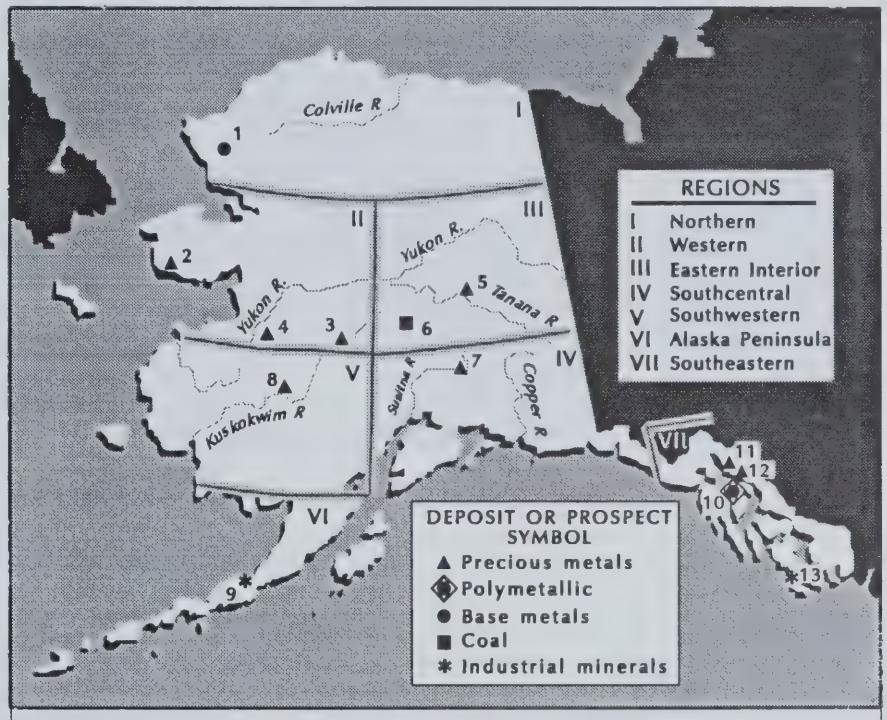
EASTERN INTERIOR REGION

Mine development expenditures from the Eastern Interior region totaled $104.61 million, compared to $6.77 million spent in 1994.

Metals

In January 1995, Fairbanks Gold Mining Inc. selected Morrison Knudsen Corp. as the general contractor for construction of the Fort Knox Gold Mine, 15 miles (23 kilometers) northeast of Fairbanks. In March, Kiewit Pacific Co. was selected to complete the earthwork, and heavy equipment was on the job site before highway load restrictions were imposed during spring breakup (fig. 11). In June the first pour of concrete from the on-site batch plant was emplaced at the freshwater dam keystone. Installation of cyanide vat-leach tanks was completed by August and by October most of the mill buildings were enclosed. At the end of the year, bench configurations of the ore body were underway. During peak of construction activities in August, an estimated 720 workers were employed on the mine site (figs. 12 and 13). Golden Valley Electric Association (GVEA) started construction of a 32-mile (51-kilometer) powerline from the Ester substation to the mine site; the powerline was about 55 percent complete by the end of the year.

Fort Knox gold mine, which is scheduled to be in production by the fourth quarter of 1996, is designed to mine and mill 13,120,000 tons (11,900,000 tonnes) of ore and produce 330,000 ounces (10,263 kilograms) of



I Northern Region

1. Red Dog—Cominco Alaska Inc. (mill circuit)

II Western Region

2. Nome area—Alaska Gold Co. (stripping pit)
3. Nixon Fork—Consolidated Nevada Goldfield (underground)
4. Illinois Creek—USMX Inc. (permitting)

III Eastern Interior Region

5. Fairbanks area
   a. Fort Knox, Fairbanks Gold Mining Inc. (mine construction)
   b. Several openpit and underground placer mines
6. Healy Clean Coal Project—Usibelli Coal Mine Inc.

IV Southcentral Region

7. Valdez Creek—Cambior Alaska Inc. (stripping, reclamation)

V Southwestern Region

8. Several placer mines (stripping overburden)

VI Alaska Peninsula Region

9. Dillingham—South Naknek (gravel pit development)

VII Southeastern Region

10. Greens Creek—Kennecott Greens Creek Mining Co. (access drifting)
11. Kensington Mine—Couer Alaska Inc. (engineering and baseline studies)
12. Alaska-Juneau Mine—Echo Bay Mines Alaska Inc. (portal and access drifts, ramps and declines)
13. Calder limestone—Sealaska (bulk sample shipment)

Figure 9. *Selected mineral development projects in Alaska, 1995.*

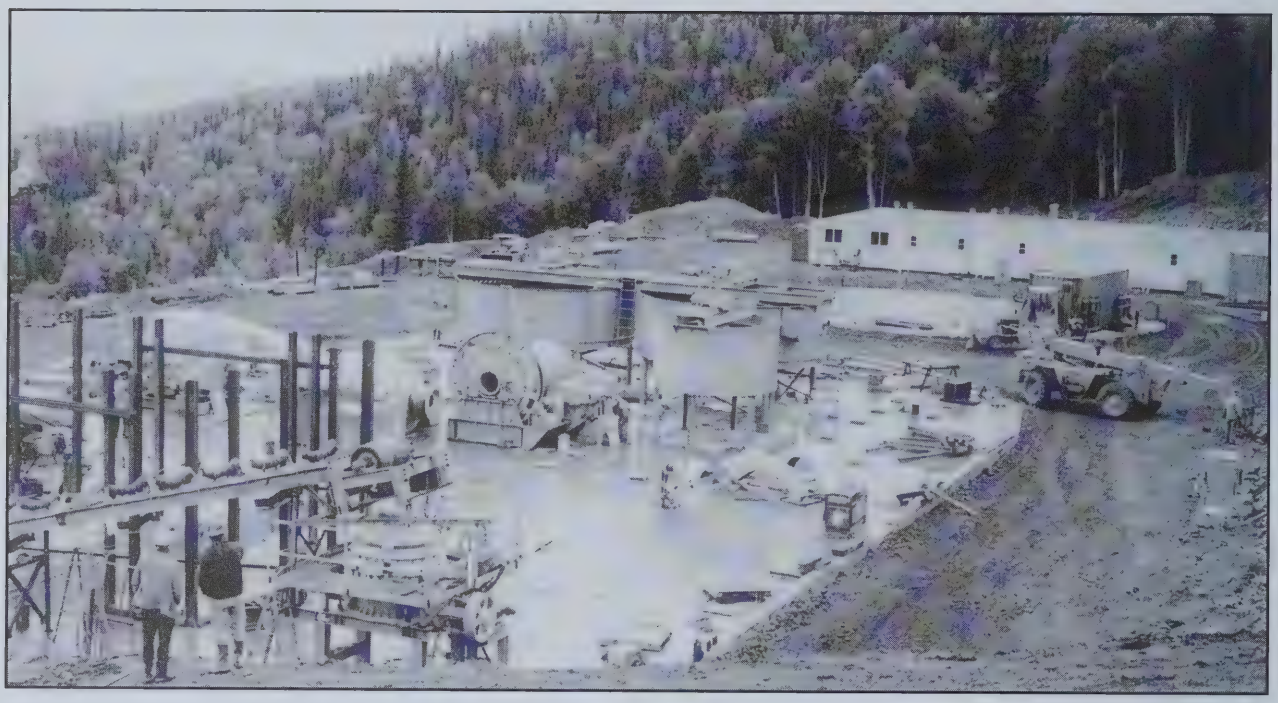


Figure 10. *Nixon Fork Mining Co., operating subsidiary of Nevada Goldfields Inc., constructed mill, camp infrastructure, airstrip, and mine facilities at the Nixon Fork gold-copper mine in 1995. Here the initial layout of the 165-ton-per-day (150-tonne-per-day) ball mill is being assembled. Subcontractors completing the development work included Wilder Construction, Golder and Associates, Lyntech Services, and Arctic Catering. The mine started production in October 1995. Photo by T.K. Bundtzen.*

Figure 11. *The tailing dam at the Fort Knox gold mine is nearing completion at the time this photo was taken in early October 1995. Kiewit Pacific and Co. emplaced more than 2.3 million tons (2.1 million tonnes) of rock and aggregate in the structure. The tailing dam will impound the mill tailings from the Fort Knox gold mine. Photo by Fairbanks Gold Mining Co.*

Figure 12. *Members of the Alaska Minerals Commission dwarfed by the 5230 Cat's 23-cubic-yard shovel at the Fort Knox Mine near Fairbanks. Photo by R.C. Swainbank.*

Figure 13. *Alaska Minerals Commission Chairman Dr. Earl Beistline looks on the various development activities at the Fort Knox Gold mine project. Photo by R.C. Swainbank.*

gold annually. Due to stringent environmental controls, Fairbanks Gold Mining Inc. will be operating the processing plant as a zero-discharge facility.

Coal

Construction of the Healy Clean Coal Project (HCCP) began in 1995. The project is designed to develop 50 megawatts of electric power for GVEA by burning about 300,000 tons (270,600 tonnes) of coal. The Alaska Industrial Development and Export Authority (AIDEA), which financed and will own the HCCP facility, provided $69.6 million in advanced funding. The Alaska Legislature provided a grant of $25 million in 1990, and the U.S. Department of Energy provided $117 million as part of a nation-wide program to provide cleaner energy. The total cost of the project is currently estimated to be $267 million. In 1995 H.C. Price submitted the low bid of $83 million for general construction of the plant and commenced work in the first quarter of the year. Throughout the summer, about 150 workers were employed at the HCCP work site near Healy. The HCCP facility will operate in a demonstration mode in 1998 and begin commercial production of electric power in 1999.

SOUTHCENTRAL REGION

Reported mine development expenditures from the Southcentral region totaled $118,750 in 1995, compared to $995,000 in 1994, a 90 percent decrease.

Metals

Several placer mining firms, including Lake Creek Placers, Empire Exploration Inc., Arnold Echola, Crow Creek Mining, and Orofino Mining and Exploration Co., reported various levels of development work on placer properties throughout the Southcentral region.

Cambior Alaska Inc. initiated extensive mine closure and reclamation efforts at their Valdez Creek placer mine. However, their cost figures are not included in table 6. The mine closed in September 1995.

SOUTHWESTERN REGION

Reported mine development expenditures from the Southwestern region totaled $38,000 in 1995, all from small placer mining firms.

Metals

Little Creek Mine, Clark-Wiltz Partnership, and Misco-Walsh Mining Co. conducted road construction, metallurgical tests, and plant modifications on small gold properties in the Southwestern region.

ALASKA PENINSULA REGION

All development expenditures from the Alaska Peninsula region was for industrial minerals.

Industrial Minerals

Bristol Bay Native Corp. began development work of several gravel deposits for future production.

SOUTHEASTERN REGION

Mineral development expenditures in the Southeastern region totaled $19.01 million in 1995, similar to the $21.04 million reported in 1994. Most of this was for mine preparation in the Juneau and Admiralty districts.

Metals

Kennecott Greens Creek Mining Co. (Kennecott) completed development level drifting and diamond drilling into the new Southwest Extension Ore Body at the Greens Creek zinc-silver-gold-lead mine on Admiralty Island, 20 miles (32 kilometers) west of Juneau. Kennecott announced in November that it would invest $87 million to bring the Greens Creek Mine, which was mothballed in 1993, back into production by January 1997 (fig. 14). By the end of 1995, about 100 employees were working at the mine site.

The mine is expected to produce about 1,320 tons (1,197 tonnes) per day with a workforce of about 250,

Figure 14. *The mill building at the Greens Creek Mine that operated from 1989 to 1993. The mine was closed due to low metal prices but is scheduled to reopen in January 1997 and become again the nation's largest silver producer. Photo by Kennecott Greens Creek Mining Co.*

with annual production of about 62,000 ounces (1,928 kilograms) of gold, 11 million ounces (342,139 kilograms) of silver, 79 million pounds (35.8 million kilograms) of zinc, and 40 million pounds (18.1 million kilograms) of lead.

The U.S. House of Representatives recently approved a land exchange with the U.S. Forest Service that allowed Kennecott to develop extralateral underground reserves in return for a royalty and ultimate transfer of patented claims to the government. Passage of this legislation is considered probable.

Coeur d'Alene Mines Inc. bought out Echo Bay Mines Alaska Inc.'s interest in the Kensington project, 42 miles (67 kilometers) north of Juneau, for $32.50 million and replanned the mine discharge point from Berners Bay (marine outlet) to a freshwater stream. Local fisherman and environmental groups had strenuously opposed the marine discharge design. During the latter part of 1995, the Kensington Project announced the undertaking of a supplemental environmental impact statement (SEIS) to adequately address proposed project changes put forward by Coeur Alaska. The most significant change is to move the mine discharge from deep water in Lynn Canal to the in-stream discharge in Sherman Creek. This discharge is designed to meet water quality standards prior to the stream's flowing into high habitat areas or into the marine environment. Coeur has announced an aggressive timeline which could lead to project permitting by the third quarter of 1996. Due to the effort expended on permitting the Kensington, Coeur did minimal work at the nearby Jualin property, which the company also owns.

Echo Bay continued development drilling and permit-level activities at the A-J Mine near Juneau. In May 1995, the U.S. Environmental Protection Agency (EPA) announced that it would investigate the merits of a submarine tailings disposal alternative, which previously had not been considered for the project. Echo Bay began investigating alternative options for tailing disposal to include both submarine disposal and upland dry tailings disposal. In order to explain the significance of these changes, and to successfully permit the revised project, Echo Bay has been working with the EPA and the State of Alaska resource agencies and has commissioned a supplemental environmental impact statement (SEIS). Under EPA direction, CH2M-Hill, as a disinterested third party, is conducting the work on the SEIS. They expect to complete the SEIS by late 1996.

Big Nugget Mine and Snow Lion Mining Co. reported minor development work at their placer properties in the Porcupine district near Haines.

Industrial Minerals

Sealaska Corp. shipped limestone from the Calder quarry area on Prince of Wales Island for development and marketing tests.

PRODUCTION

The value of 1995 Alaska mineral production is estimated at $537.21 million, a 6 percent increase or $29.81 million more than 1994 levels (table 8). Total gross values for individual commodities are zinc, 64 percent; gold, 10 percent; coal, 8 percent; lead, 6 percent; sand and gravel, 6 percent; stone, 4 percent; and silver, platinum, jade, soapstone and peat combined, 2 percent.

Mineral production statistics as summarized in table 8 originate from 195 gold, polymetallic, coal, and industrial mineral mines and quarries that operated in all seven regions of Alaska. Figures 15, 16, and 17 graph trends in sand and gravel, gold, and coal production. Selected mine sites are shown in figure 18.

Mineral production estimates were derived as of April 21, 1996 from (1) 153 DGGS mineral questionnaires returned from Native corporations, mining companies, individuals, and government agencies; (2) a phone survey of selected metallic and industrial mineral firms; (3) Alaska Placer Mining Application (APMA) records; and (4) materials-use summary provided by the Northern Region of the Department of Transportation and Public Facilities.

Forty-eight percent of the industrial mineral producers and all energy mineral respondents provided unit values for mineral commodities. We compute unit value of metals by averaging 12 monthly commodity prices published by the *Mining Journal Ltd.* Therefore, value estimates for each metal listed in table 8 do not take into account transportation, refining, or other costs incurred during the mining process.

Metals continued to dominate mineral production and accounted for 82 percent of 1995 Alaska mineral value. Overall value for metals increased from $402.30 million in 1994 to $442.68 million in 1995, a 10 percent increase. Zinc and lead output accounted for 70 percent of the total Alaska mineral industry production value. More important, the giant Red Dog mine in the Northern region became the world's largest zinc mine, accounting for approximately 8 percent of the world's mine-produced zinc. Planned Red Dog mill expansions in the near future will probably add to an increasingly dominant Alaska position in the world's zinc markets. Although the zinc price remained flat at 48 cents per pound, the lead price nearly doubled to 34 cents per

pound, which improved economic viability for Alaska lead-bearing ores.

Despite silver price increases in 1995, Alaska silver output decreased from 1.97 million ounces (61,200 kilograms) in 1994 to 1.22 million ounces (38,120 kilograms) in 1995, reflecting adjustments to the amount of silver recovered from Alaska base-metal ores. The anticipated reopening of the Greens Creek polymetallic-silver mine on Admiralty Island in January 1997 will substantially increase Alaska's silver output in the next few years.

In 1995, 145 Alaska mines produced 141,882 ounces (4,410 kilograms) of refined gold worth $56.04 million, compared to 182,100 ounces (5,663 kilograms) gold worth $70.29 million that was produced from 182 gold mines in 1994 (table 9). A 21 percent decline in the number of placer mines caused the gold production decline. However, a new lode gold producer—the Nixon Fork underground gold-copper mine near McGrath—began production in October 1995, which helped offset further gold production declines.

Table 8. *Estimated mineral production in Alaska, 1993–95*[a]

	Quantity			Estimated values[b]		
Metals	**1993**	**1994**	**1995**	**1993**	**1994**	**1995**
Gold (ounces)	191,265	182,100	141,882	$ 68,640,800	$ 70,290,600	$ 56,043,390
(kilograms)	5,948	5,663	4,410			
Silver (ounces)	5,658,958	1,968,000	1,225,730	24,333,519	10,391,040	6,655,714
(kilograms)	175,994	61,205	38,120			
Platinum (ounces)	3	5	1	1,235	2,065	430
(grams)	95	158	31			
Lead (tons)	38,221	36,447	58,530	13,759,560	25,512,900	34,428,600
(tonnes)	34,667	33,065	53,098			
Zinc (tons)	268,769	329,003	359,950	236,516,720	296,102,700	345,552,000
(tonnes)	243,774	298,472	326,547			
Tin (pounds)	21,000	W	W	50,610	W	W
(kilograms)	9,526	W	W			
Subtotal				**$343,302,444**	**$402,229,305**	**$442,680,134**
Industrial minerals						
Jade and soapstone (tons)	2.6	2.3	2.0	$ 20,000	$ 20,000	$ 25,000
(tonnes)	2.4	2.1	1.8			
Sand and gravel (million tons)	13.2	13.5	9.8	40,636,815	40,950,651	30,886,821
(million tonnes)	11.9	12.3	8.9			
Building stone (million tons)	3.6	3.8	2.8	26,205,784	27,038,008	22,163,703
(million tonnes)	3.3	3.5	2.6			
Subtotal				**$ 66,862,599**	**$ 68,008,659**	**$ 53,075,524**
Energy minerals						
Coal (tons)	1,586,795	1,490,000	1,640,000	$ 38,103,600	$ 36,750,000	$ 41,300,000
(tonnes)	1,439,223	1,351,730	1,487,808			
Peat (cubic yards)	72,000	87,900	35,000	445,000	439,500	157,500
(cubic meters)	55,051	67,208	26,761			
Subtotal				**$ 38,548,600**	**$ 37,189,500**	**$ 41,457,500**
TOTAL				**$448,713,643**	**$507,497,464**	**$537,213,158**

[a]Production data from DGGS questionnaires, phone interviews with mine or quarry operators, Alaska Department of Transportation and Public Facilities, and federal land management agencies.

[b]Values for selected metal production based on average prices for each year; for 1995—gold ($395/ounce); silver ($5.43/ounce); zinc ($0.48/lb); lead ($0.34/lb). All other values provided by mine operators.

W = Withheld.

Alaska's largest gold producer, Cambior's Valdez Creek placer mine, produced 32,750 ounces (1,018 kilograms) of gold or 23 percent of all of the gold mined in the state. However, the Valdez Creek mine, after 12 years of operation, ceased production on September 24, 1995.

Most other large placer gold mines traded production rankings, but there has been a continuing decline in the number of medium- and small-scale producers. Because of the production loss from the Valdez Creek mining operation, coupled with forecasted gold production declines from other significant placer producers, the amount of placer gold produced in Alaska is expected drop to about 100,000 ounces (3,110 kilograms) in 1996 and then stabilize.

The 10 largest Alaska gold mines in 1995, not necessarily in the following order, were Cambior Alaska Inc., Valdez Creek district; Alaska Gold Co., Cape Nome district; Polar Mining Inc., Fairbanks district; Alaska Placer Development, Livengood-Tolovana district; Nixon Fork Mining Co., McGrath-McKinley district; Silverado Mines, Koyukuk-Nolan district; Clark-Wiltz Partnership, Innoko district; Little Eldorado Group, Fairbanks district; Green Mining and Exploration, Ruby-Poorman district; and Girdwood Mining Co., Girdwood district. These companies produced 101,039 ounces (3,142 kilograms) of gold or 71 percent of the total 141,822 ounces (4,410 kilograms) of gold produced statewide.

Despite a continuing erosion of the number of Alaska placer gold producers, placer mines employed 975 people in 1995, or 29 percent of all mining jobs statewide, and provided many employment opportunities in rural Alaska. Surprisingly, production costs needed to produce an ounce of gold

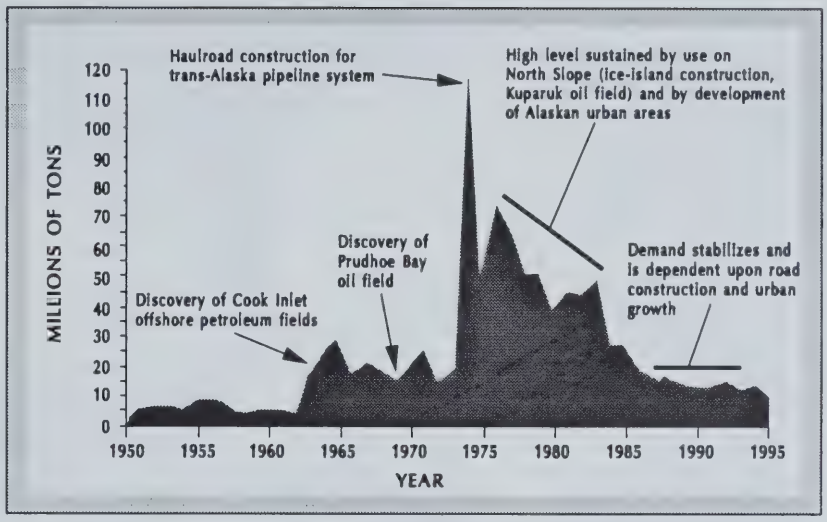


Figure 15. *Sand and gravel production in Alaska 1950–95.*

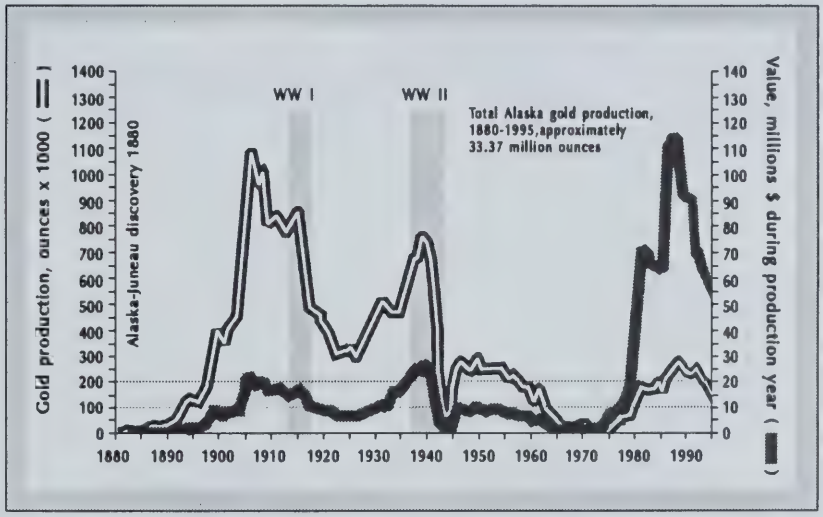


Figure 16. *Amount and value of gold production in Alaska 1880–1995.*

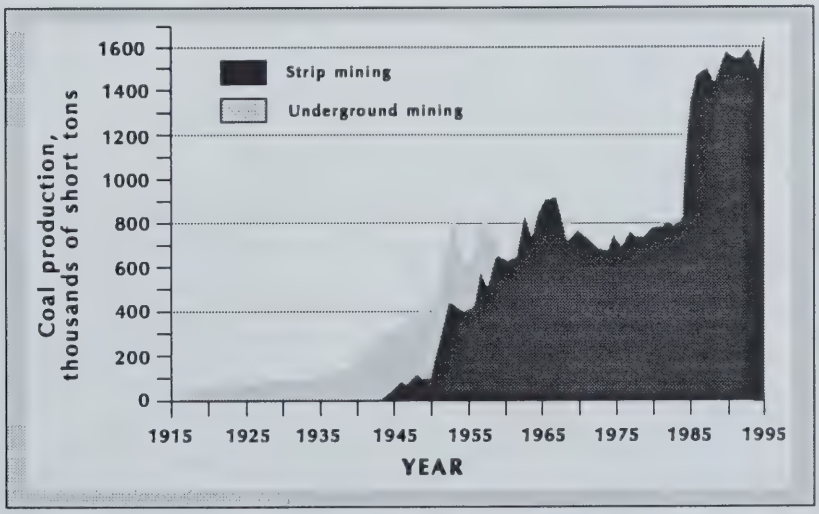
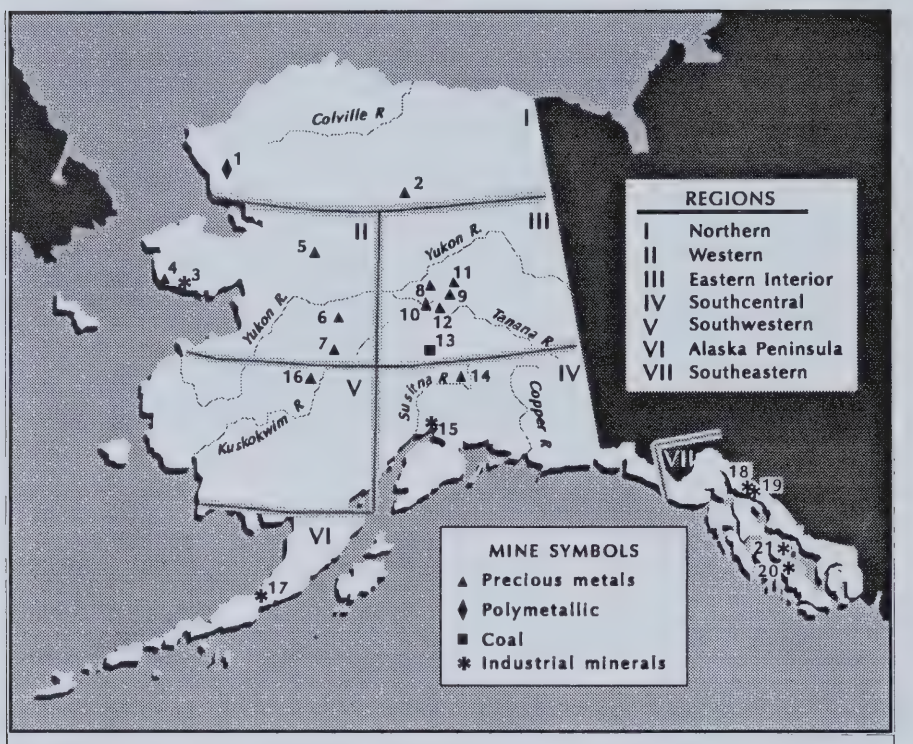


Figure 17. *Coal production in Alaska 1915–95.*



I Northern Region
1. Red Dog Mine—zinc-lead-silver
2. Silverado Mines (U.S.) Inc.—gold

Metallic mines 6
Industrial mineral producers 3

II Western Region
3. Cape Nome Quarry—rock, sand and gravel
4. Alaska Gold Co.—gold
5. Taiga Mining/Hogatza—gold
6. Green Mining and Exploration—gold
7. Rosander Mining Co.—gold

Metallic mines 25
Industrial mineral producers 5

III Eastern Interior Region
8. Alaska Placer Development—gold
9. Polar Mining Inc.—gold
10. Thurman Oil & Mining—gold
11. Little Eldorado Group—gold
12. Cooks Mining—gold
13. Usibelli Coal Mining Inc.—coal

Metallic mines 89
Industrial mineral producers 10

IV Southcentral Region
14. Valdez Creek Mine—gold
15. Palmer/Wasilla area—gravel pits

Metallic mines 10
Industrial mineral producers 17

V Southwestern Region
16. Clark-Wiltz Partnership—gold

Metallic mines 13
Industrial mineral producers 1

VI Alaska Peninsula Region
17. Bristol Bay Native Corporation—sand and gravel

Metallic mines 0
Industrial mineral producers 2

VII Southeastern Region
18. Hildre Sand and Gravel—gravel
19. RSH Company—stone
20. U.S. Forest Service—rock, sand and gravel
21. Sealaska Corporation—rock, sand and gravel

Metallic mines 2
Industrial mineral producers 6

Figure 18. *Selected production projects, 1995.*

decreased throughout the Alaska placer mining industry. The average gold mining costs as determined from records of 20 small, medium, and large placer mining firms were $327 per ounce of gold ($10.17 per gram) in 1995, compared to $343 per ounce of gold ($10.66 per gram) in 1994. The biggest improvements were in small ($231 per ounce of gold; $7.10 per gram) and medium sized ($245 per ounce of gold; $7.60 per gram) mines; the production costs of large placer mines remained unchanged at $341 per ounce of gold ($10.60 per gram) for both 1994 and 1995 (table 10).

Volume and value of industrial mineral production dropped from 1994 to 1995 because of reduced demands for the products. There were fewer logging road and urban construction projects in the Southeastern and Southcentral regions, and several highway rebuilding projects in the Eastern Interior region were completed. The largest decline occurred in the sand and gravel industry, which dropped from 13.5 million tons (12.3 million tonnes) worth $40.95 million in 1994 to 9.8 million tons (8.9 million tonnes) worth $30.89 million in 1995, a 25 percent drop in both categories (tables 8 and 11).

Stone production also decreased from 3.8 million tons (3.5 million tonnes) worth $27.04 million in 1994 to 2.8 million tons (2.6 million tonnes) worth $22.16 million in 1995, a decline of about 18 percent (tables 8 and 12). Mine construction projects at

Table 9. *Reported refined gold production, number of operators, and industry employment in Alaska, 1994–95*

Region	Number of operators		Production in ounces of gold		Number of employees	
	1994	1995	1994	1995	1994	1995
Northern	9	6	10,292 (320 kg)	6,265 (195 kg)	77	58
Western	32	25	42,783 (1,374 kg)	38,100[a] (1,184 kg)	255	261
Eastern Interior	103	89	69,511 (2,161 kg)	53,690 (1,670 kg)	490	376
Southcentral	19	10	49,723 (1,546 kg)	35,094 (1,090 kg)	238	232
Southwestern	17	13	9,650 (300 kg)	8,548 (265 kg)	84	80
Southeastern	2	2	141 (4 kg)	185 (6 kg)	6	6
TOTAL	**182**	**145**	**182,100 (5,663 kg)**	**141,882 (4,410 kg)**	**1,150**	**1,013**

[a]Includes 6,213 ounces gold from Nixon Fork hardrock mine. All other gold derived from placer sources.

Nixon Fork and Fort Knox accounted for nearly 75 percent of stone use statewide.

Usibelli Coal Mine Inc., Alaska's only coal producer in 1995, mined and shipped a record 1,640,000 tons (1,487,808 tonnes) of subbituminous coals to power plants in interior Alaska and in South Korea. Improving coal prices helped the Alaska coal market. Small companies continued to mine peat in the Fairbanks and Anchorage areas.

NORTHERN REGION

Metals

Cominco Alaska Exploration Inc. milled 2,485,900 tons (2,255,200 tonnes) of zinc-lead-silver ore at the Red Dog mine in northwest Alaska, and shipped 645,100 tons (585,200 tonnes) of zinc concentrate, 101,300 tons (91,900 tonnes) of lead concentrate, and 7,200 tons (6,500 tonnes) of bulk concentrate from the port of Kivalina, north of Kotzebue, to overseas and Canadian smelters (table 13). In 1995, Red Dog Mine became the world's largest zinc mine, producing about 8 percent of the world's mine-produced zinc. Concentrate production increased by 95,600 tons (86,728 tonnes) or by 14.5 percent from 1994 levels mainly as a result of increased capacity of grinding circuits in the mill. The quality of lead and zinc concentrates improved, which resulted in increased metal recoveries during refining. Figure 19 depicts production trends from the Red Dog mine since 1989. Approximately 79 percent of the 397 employees on the payroll are Alaska residents. Fifty percent of the Red Dog employees are shareholders of NANA Corp., which owns the ore deposit. Because sea-ice conditions prevented timely delivery of diesel fuel to the Port of Kivalina, Cominco contracted Everts Air Fuel Operations of Fairbanks and Northern Air Cargo of Anchorage to haul fuel to the Red Dog mine during the spring and summer of 1995.

Placer mines in the Northern region continued to recover gold but at reduced levels from 1994. An estimated 6,265 ounces (195 kilograms) of gold was recovered by six mining operations in the Koyukuk-Nolan and Chandalar districts, a 39 percent decline in production from 1994 levels (table 9). Silverado Mines (U.S.) Inc. (Silverado) again operated the largest mine in the Northern region, and accounted for more than half of the 1995 total (fig. 20). Most of Silverado's production came from opencut placer mine pits on Eureka and Mary's benches, which are ancestral stream courses of Nolan Creek. The company employed 14 workers during the summer sluicing operations. Previous underground drifting efforts by Silverado were closed during the year.

Smaller placer mines also operated in the general Wiseman area. Compass Mining operated a small drift on Linda Creek. Myrtle Creek Mining produced gold from federal claims on Myrtle Creek. Davis Creek Mine Inc. (Steve Greene) initiated small scale production and bulk sampling on Davis Creek, a tributary of the South Fork Koyukuk River, and plans to expand operational levels in 1996.

Gold Dust Mines operated a placer mine on Big Creek in the Chandalar district east of Wiseman. Paradise Valley Mining operated a commercial placer mine in conjunction with a tourist-oriented recreational mine venture on Birch Creek east of Wild Lake.

Industrial Minerals

Three questionnaire respondents reported that 604,580 tons (548,470 tonnes) of sand and gravel (table 11) and 73,070 tons (66,290 tonnes) of riprap and D-1 stone products (table 12) were used in the Northern region in 1995, a similar amount that was used in 1994.

Table 10. *Production costs for selected Alaska placer gold mines, 1990–95*

Mine size	1990	1991	1992	1993	1994	1995
			Number of mines			
Small[a]	8	21	23	19	24	11
Medium[b]	11	8	6	4	6	5
Large[c]	5	5	5	2	4	4
TOTAL	**24**	**34**	**34**	**25**	**34**	**20**
			Production in ounces			
Small[a]	1,856	3,582	3,842	3,919	2,789	1,459
Medium[b]	12,132	8,431	5,759	5,825	7,471	5,890
Large[c]	54,497	84,539	128,992	25,335	48,864	43,390
TOTAL	**68,485[d]** (2,124 kg)	**96,552[e]** (3,002 kg)	**138,593[f]** (4,310 kg)	**35,079[g]** (1,091 kg)	**59,124[h]** (1,839 kg)	**50,739[i]** (1,578 kg)
			Total reported mine costs			
Small[a]	$ 560,600	$ 1,018,606	$ 940,000	$ 1,031,500	$ 989,076	$ 336,300
Medium[b]	3,314,000	2,518,239	1,460,000	1,905,125	2,597,782	1,440,000
Large[c]	18,990,000	31,857,228	41,650,000	7,605,000	16,706,600	14,795,000
TOTAL	**$22,864,600**	**$35,394,073**	**$44,050,000**	**$10,541,625**	**$20,293,458**	**$16,571,300**
			Unit cost per ounce			
Small[a]	$302	$284	$245	$263	$354	$231
Medium[b]	273	298	255	327	347	245
Large[c]	348	376	322	300	341	341
TOTAL	**$334**	**$366**	**$318**	**$300**	**$343**	**$327**

[a]10-650 oz gold/yr.
[b]650-2,500 oz gold/yr.
[c]>2,500 oz gold/yr.
[d]36% of total Alaska placer gold production.
[e]46% of total Alaska placer gold production.
[f]61% of total Alaska placer gold production.
[g]19% of total Alaska placer gold production.
[h]32% of total Alaska placer gold production.
[i]37% of total Alaska placer gold production.

Alyeska Pipeline Service Co. reported use of pit-run gravel, three-eights aggregate, D-1, and riprap for repair work to roads maintaining the trans-Alaska pipeline system, accessing nearly 20 pits in the Northern region. The Department of Transportation and Public Facilities reported use of about 125,000 tons (113,400 tonnes) of sand and gravel for maintenance along the Dalton Highway north of the Yukon River.

Minor amounts of riprap were used by Cominco Alaska Inc. to shore up culverts along the 55 mile (88 kilometer) haul road from the mine site to Kivalina on the Chuckchi Sea coast.

WESTERN REGION

Metals

Twenty-four placer and one hardrock mine produced 38,100 ounces (1,184 kilograms) of gold in the Western region, a modest decline of 10 percent from 1994 levels (table 9). The Alaska Gold Co. recovered 19,000 ounces (591 kilograms) of refined gold from two open pit operations on the Nome Coastal Plain near the town of Nome. Alaska Gold moved a total of 1.60 million cubic yards (1.22 million cubic meters) of material and processed 350,000 cubic yards (267,600 cubic meters) as pay gravels. The company

Table 11. *Reported sand and gravel production and industry employment in Alaska by region, 1995*

Region	Companies and agencies reporting[a]	Tons	Estimated unit value ($/ton)[b]	Total value	Estimated number of employees
Northern	2	604,580	$4.50	$ 2,720,610	25
Western	3	993,882	6.25	6,211,760	40
Eastern Interior	8	3,207,012	2.60	8,338,230	180
Southcentral	13	4,179,460	2.55	10,657,623	255
Southwestern	1	292,500	1.25	365,625	20
Alaska Peninsula	2	341,356	4.50	1,536,102	35
Southeastern	3	228,760	4.62	1,056,871	22
TOTAL	**32**	**9,847,550 (8,933,700 tonnes)**	--	**$30,886,821**	**577**

[a]From 31 returned questionnaires and 1 phone canvas response.
[b]Values are based on price and cost estimates from 13 producers (41%) of the canvas and about 35% of the total product value.

Table 12. *Reported stone production and industry employment in Alaska by region, 1995*[a]

Region	Companies and agencies reporting[b]	Tons	Estimated unit value ($/ton)[c]	Total value	Estimated number of employees
Northern	1	73,070	$12.00	$ 876,840	10
Western	2	131,810	15.00	1,977,150	30
Eastern Interior	2	2,388,000	7.50	17,910,000	100
Southcentral	4	89,175	5.00	445,875	20
Southwestern	1	4,844	8.90	30,794	5
Alaska Peninsula	--	--	--	--	--
Southeastern	3	129,097	7.15	923,044	35
TOTAL	**13**	**2,815,996 (2,554,670 tonnes)**	--	**$22,163,703**	**200**

[a]Includes riprap, shot rock, crushed stone, drainage rock, and ornamental stone; does not include jade.
[b]Derived from13 questionnaires.
[c]Unit value based on data supplied by nine operations or 75 percent of the total. Unit values for different stone products vary widely.

has committed itself to an annual exploratory drill program which should allow opencut operations to continue for at least 10 more years. Alaska Gold has now completely converted from a bucket-line gold dredge to a mechanized opencut mine operator. Dredges 5 and 6, which were previously the company's principal gold producers, were mothballed in 1995.

Steve Pomrenke again operated a very successful opencut placer mine at Tripple Creek also in the Cape Nome district and produced both gold and an aggregate product from privately patented ground.

Other operators actively mining on the Seward Peninsula include Dan Walsh on Dexter Creek, Cape Nome district; Bart Pettigrew, Anvil Creek, Cape Nome district; and the Tweet family and Ralph Anderson, Kougurok district.

Taiga Mining leased the Hogatza dredge from the Alaska Gold Co. and mined for another season. The company hopes to continue dredge operations on Bear Creek and possibly expand to other nearby drainages where exploration results warrant. Small suction dredge and hand miners continued to extract gold from Nome's beachline (fig. 21).

Green Mining and Exploration prepared and mined a large open-cut mine on Birch Creek about 6 miles (10 kilometers) east of Long Creek in the Ruby–Poorman district. This was the only placer mine of any size that operated in the Long Creek area. Because of marginal results in the deep, expensive-to-mine ground, Green Mining and Exploration announced late in the year that they would move to the Rampart district in 1996. Pete Haggland mined at Poorman but reported disappointing results for the 1995 season. It now seems possible that there will be no placer mining operations in the Ruby–Poorman district in 1996.

Rosander Mining Co. operated a placer mine at Colorado Creek north of McGrath using a crew of six. Rosander's Colorado Creek property contains ancestral stream deposits overlain by eolian deposits rich in Pleistocene faunal remains.

Doug Sherrer hand-mined the Boob Creek placer deposit west of Ophir and recovered minor amounts of gold and the state's only 1995 platinum production (1 ounce; 31.10 grams).

On October 15, 1995, Nixon Fork Mining Co. (NFMC), operating subsidiary for Nevada Goldfields Inc., began milling hardrock gold and copper ores at the Nixon Fork underground gold mine about 28 air miles

Table 13. *Cominco Alaska's Red Dog Mine, production statistics, 1990–95*

	1990	1991	1992	1993	1994	1995
Ore milled (tons)	996,700[a]	1,599,300	1,582,000	1,874,600[a]	2,339,500	2,485,900
(tonnes)	904,200	1,450,900	1,435,200	1,700,600	2,121,900	2,225,200
Ore grade						
Zinc	26.5%	22.5%	19.9%	18.4%	18.8%	19.0%
Lead	8.5%	6.6%[a]	6.0%	5.7%[a]	5.7%	5.8%
Silver						
(oz/ton)	3.6[a]	2.8	2.9	2.8	2.8	2.8
(g/tonne)	123[a]	96	99	96	96	96
Concentrate						
Zinc (tons)	337,400	410,700	405,900	465,600	588,100	645,100
(tonnes)	306,100[a]	372,600	368,200	422,400	533,400[a]	585,200
(grade)	56.9%[a]	57.1%	57.0%	54.8%	55.8%	55.6%
Lead (tons)	56,600[a]	76,600[a]	28,000	48,700	59,700	101,300
(tonnes)	51,400	69,500	25,400	44,200	54,200[a]	91,900
(grade)	55.1%	57.2%	57.0%	50.9%	54.9%	55.0%
Bulk concentrate (tons)	49,600	34,100	41,000	25,500	10,200	7,200
(tonnes)	45,000	31,000	37,200	23,100	9,300	6,500
Bulk concentrate (grade)						
Zinc	31.7%	32.8%	23.0%	16.2%	19.8%	17.7%
Lead	22.9%	20.9%	27.0%	38.9%	36.0%	39.1%
Total concentrate (tons)	**443,600**	**521,400**	**474,900**	**539,800**	**658,000**	**753,600**
(tonnes)	**402,500**	**473,100**	**430,800**	**489,700**	**596,900[a]**	**683,600**
Employees	350	331	349	376[a]	311	397

[a]Revised slightly from Swainbank and others, 1995.
SOURCE: Jim Kulas, Cominco Alaska Inc.

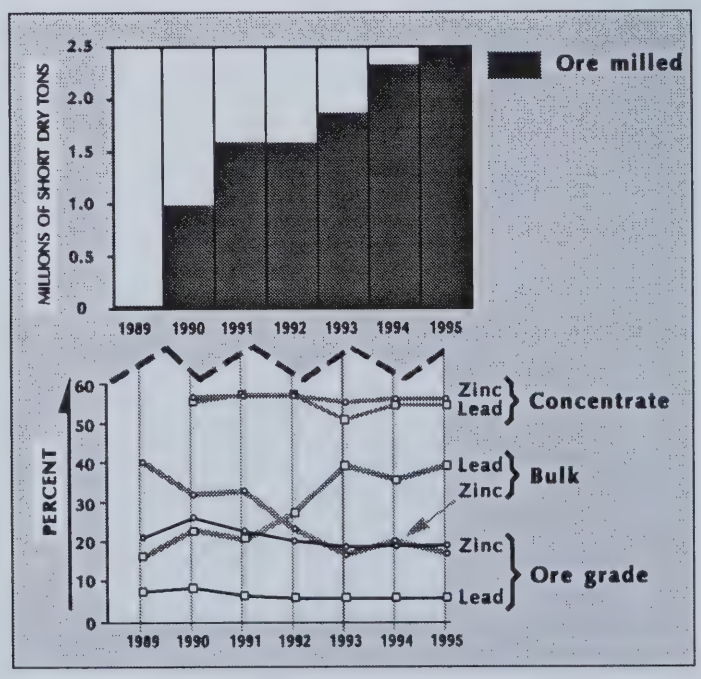


Figure 19. *Ore and metal contents of concentrate from Red Dog Mine, 1989–95.*

Figure 20. *Silverado Mines (U.S.) Inc. mined ancestral bench levels of Nolan Creek in the Koyukuk–Nolan district during 1995. The Silverado operation was again the largest gold mine in the Northern region. Photo by T.K. Bundtzen.*

(45 kilometers) northeast of McGrath. Mine construction began on March 27 and ended in October. By December the mine had sold 6,213 ounces (193 kilograms) of gold derived from dore bar and sulfide concentrate sales. Byproduct copper will be included in 1996 production credits. Gold-copper concentrates are shipped to Anchorage on Woods Air Service aircraft enroute to Dallo Inc. of Kosaka, Japan.

Mining methods used at Nixon Fork mine are a combination of drift and fill, and shrinkage stoping (Freeman, 1996). The ore is crushed in two stages, using jaw and cone crushers, to a 0.75 inch (1.91 centimeter) size. Crushed ore is stored in a surge bin that feeds a two-stage ball mill. There is no mill effluent and water is recycled from a tailings thickener and from the tailings impoundment facility.

For the 1995 production schedule, NFMC employed 63 people working on a two-weeks-on and one-week-off rotation schedule. About 60 percent of the employees are Alaska residents, with about 10 percent from nearby village communities.

NFMC's objectives for gold production are 148 tons per day at 2.3 ounces per ton (135 tonnes per day at 78.9 grams per tonne) and 80.5 percent gold recovery. The mine is projected to produce 55,000 ounces (1,711 kilograms) of gold annually with a byproduct of copper at a cash operating cost of $135 per ounce ($4.20 per gram) of gold.

Industrial Minerals

Five companies, Native corporations, and government agencies reported that 993,882 tons (901,650 tonnes) of sand and gravel and 131,810 tons (119,580 tonnes) of stone products were quarried throughout the Western region, a 10 percent increase above 1994 production levels (tables 11 and 12). Besides typical road-maintenance projects, riprap was shipped to various villages outside the region for erosion control applications.

Sound Quarry Inc., a wholly owned subsidiary of Bering Straits Native Corp., continued its production of riprap from Cape Nome Quarry through its venture partner, Board of Trade Inc. (BOT), a local Nome contractor. In 1995, BOT produced 58,747 tons (53,050 tonnes) of rock, half of which was for riprap armor stone and the remainder for cement mix, D-1, 3/4- inch aggregate, and asphalt. Fifteen Bering Straits Native Corp. shareholders are employed in the riprap extraction activities.

Galena Construction mined sand and gravel from an open pit at Galena mainly for local municipal projects.

The Alaska Department of Transportation and Public Facilities (DOTPF) reported brisk activity levels for both rock and sand and gravel applications at 10 airport improvement projects in the Western region. In addition, road maintenance around Nome used select riprap and several sites for the Nome-Council road-upgrade project used substantial amounts of sand and gravel.

Figure 21. *A suction dredge operator working the beach sands of Norton Sound in the Cape Nome district of the Northern region much like the early argonauts did during the Gold Rush era. Photo by T.K. Bundtzen.*

EASTERN INTERIOR REGION

Metals

Eighty-nine placer mines in the Eastern Interior region produced 53,690 ounces (1,670 kilograms) of gold worth $21.20 million, down 23 percent in weight and value from 1994 (table 9). Polar Mining Inc. (PMI) again ran a year-round operation at its large placer gold mine on Lower Goldstream Creek in the Fairbanks district. During the year the company moved 3,600,000 cubic yards (2,752,560 cubic meters) and washed 505,000 cubic yards (386,120 cubic meters) of pay gravel. Recovered ore grade from all material moved at the mine in 1995 was 0.00286 ounce per ton (0.080 grams per tonne) gold (May and Bundtzen, 1996). PMI mine cuts averaged 1,250,000 bedrock square feet (35,398 cubic-meter area) during each of the last three mining seasons (1993–95). PMI operates with a fleet of four to six 55-ton (50-tonne) Cat 773 trucks to haul rock fill materials that are loaded by two 13-cubic-yard (9.9-cubic-meter) Cat 992 loaders. PMI also used two D10L dozers and deployed a Cat 16G grader.

The 1996 season is the last mining season planned by PMI at Lower Goldstream Creek. PMI will finish the Lower Goldstream paystreak by August 1996 and move mine operations to a another large placer gold deposit on upper Goldstream Creek near Fox. Reclamation activities will be done concurrently during production operations in 1996 and 1997. The last three mine cuts on Lower Goldstream Creek are designed to become an interconnected pond.

Cook's Mining, a long time-producer of placer gold, took out a cut on its upper Fairbanks Creek claims in early summer. In mid-July the company moved its operations to the 7 B/D Claims leased from Alder Creek Mines Inc. on Lower Fairbanks Creek. Alf Hopen continued for the second year on Cleary Creek on ground leased from the Alaska Gold Co. DEPEM continued to mine in the upper Goldstream Valley drainage. Ron Roman continued to mine on Pearl Creek, a tributary of Fish Creek.

Little Eldorado Group finished its first full year of production from its Little Eldorado Creek drift mine northeast of Fairbanks (figs. 22 and 23). Based on past and present drilling programs, the company identified a 760,000 bedrock foot (70,604 square meter) paystreak that averages 0.058 ounces (1.8 grams) of gold per bedrock foot (May and Bundtzen, 1996). The frozen gravel paystreak is approximately 170 feet (52 meters) below the surface. A seasonal crew of eight miners completed 1,340 feet (408 meters) of drifting and sluiced 22,000 cubic yards (16,820 cubic meters) of pay gravels during the summer season. This output was enough to rank Little Eldorado Group as Alaska's seventh largest gold producer in 1995. The company expects to approximately double the 1995 production level in 1996. The mine equipment deployed by Little Eldorado Group included 5-ton (4.5-tonne) capacity Young Machine Co. buggies and 1 cubic yard (0.91 cubic meter) LHD dumpers formerly used in uranium mining ventures in the American southwest.

Sam Skidmore mined 300 cubic yards (229 cubic meters) of pay gravels from his underground drift mine on Vault Creek, west of the Little Eldorado Group operation.

Alaska Placer Development (APD) purchased the placer claims it leased over the years from the original claim owners Callahan Lead-Zinc and continued to mine the Livengood Bench in the Livengood-Tolovana district north of Fairbanks. APD was Alaska's fourth largest gold producer in 1995.

Activity continued in the Hot Springs and Rampart districts. Salter and Associates worked Seattle Bench,

Hot Springs district; Cassiterite Placers Inc., worked Sullivan Bench, Hot Springs district; DeLima Placers mined on American Creek near Manley Hot Springs; and Kelly Mining Co. mined North Fork Creek in the Hot Springs district. Wayne Gibson worked a small cut on Golden Creek, in the Tanana B-6 Quadrangle, a part of the Melozitna district.

The Circle Mining district continued to produce gold but at greatly reduced levels from those established just a few years ago. Paul and Co. took out cuts on

Figure 22. *Miner operator Mike Roberts stands by portal of Little Eldorado Group drift mine on Little Eldorado Creek, Fairbanks district, Eastern Interior region. With a crew of eight, Little Eldorado Group mined frozen pay gravels during winter months with low profile rubber tired diesel powered mining equipment and sluices pay gravels in early summer. Little Eldorado Group is Alaska's largest underground placer gold mining venture. Photo by T.K. Bundtzen.*

Figure 23. *Miner Andrew Wescott explaining mining methods to visitors at Little Eldorado Group operations in Fairbanks district. The pay gravels depicted here are approximately 170 feet (52 meters) below the surface. Photo by C.G. Mull.*

Frying Pan Creek but reported that the drilling results did not match production results. Doug Miller worked ground on Bonanza Creek. Underwood Mining Co. worked paystreaks near Central.

Two mines recovered gold in the Bonnifield district, in the Alaska Range south of Fairbanks. Totat Mining mined on the Totatlanika River and received a Governor's Reclamation Award for its post-mine-use planning efforts. Mike Hartman mined on Caribou Creek but reported that extensive mechanical problems with equipment and excessive rain limited his operations.

The Richardson district was again active. Earl Voytilla and Groppel (two operations) mined on Tenderfoot Creek and the Loveless-Rubel Partnership took out a small cut in the divide between Junction and Democrat Creeks.

Five placer mining firms reported production activities in the Fortymile district. The 45 Pup Mining Co. sluiced gravels from the 45 Pup placer deposit for 50 hours and stripped about 15,000 square feet (425 square meters) for next year's output.

Busby Mining continued to operate the largest placer mine in the Fortymile district, on Chicken Creek, on ground leased from the Alaska Gold Co. Long time miner Alice Bayless retired from the operation after many years of involvement in the Alaska placer industry. Her long-time partner Mike Busby will continue to mine the deposit at Chicken Creek. Because a significant amount of ground was either previously worked or contained inadequate values, the total amount of auriferous gravel and gold output produced by Busby Mining was down in 1995 from previous years.

In the Fortymile district, Leo Regner worked Mosquito Fork, Taylor's Mining worked Fortymile River, and Maxwell Mine and Exploration processed placer deposits on Canyon Creek. All are small-scale suction-dredge or small mechanized operations.

Industrial Minerals

Ten private firms and government agencies reported that 3,207,012 tons (2,909,400 tonnes) of sand and gravel worth $8.34 million and 2,388,000 tons (2,166,390 tonnes) of stone worth $17.91 million were excavated from the Eastern Interior region (tables 11 and 12). Stone production was up significantly from 1994 levels, but sand and gravel output was down significantly from the early 1990s. At that time large, federally funded road projects in Fairbanks—the Johansen Expressway and Geist Road Extension—were underway. One of the largest projects in 1995 was construction of a tailings dam at the Fort Knox gold project 15 miles (24 kilometers) northeast of Fairbanks. The 2.1 million tons (1.9 million tonnes) of aggregate and stone required for the tailings dam amounted to about 80 percent of the total statewide use of those materials.

Polar Mining Inc., known best for its gold production, produced nearly 30,000 cubic yards (27,220 cubic meters) of a high quality, sized aggregate that is used as road surface material throughout the Fairbanks area. ACE General Contractors provided gravel and sand from its pits at 1818 Old Steese Highway near Fairbanks to private vendors as needed. Rolling Stone Inc. mined gravel from its 33 Mile Richardson Highway pits, and Nistler Enterprizes Inc. produced gravel and sand from pits near Delta Junction.

DOTPF subcontracted sand and gravel and stone use for both urban development and regional road construction projects. Their work included upgrading Badger Road, rehabilitation of the Richardson, the Taylor, and the Parks Highways, and emergency repair work on the Dalton Highway south of Yukon River. Regional airports at Healy and Clear also received remedial work. Eastwind Inc., subcontractor for DOTPF, accounted for nearly 40 percent of the sand and gravel and stone used in the Eastern Interior region while upgrading the Taylor Highway from Mile 3 to Mile 31. At least 1.26 million tons (1.14 million tonnes) of sand and gravel and 150,000 tons (136,000 tonnes) of crushed D-1 were locally quarried for the project's use.

Coal and Peat

Value of coal and peat rose from $37.19 million in 1994 to $41.46 million in 1995, an increase of 12 percent. Usibelli Coal Mine Inc. (UCM) mined a record 1,640,000 tons (1,487,808 tonnes) of subbituminous coal from the Poker Flats and Gold Run pits near Healy. Approximately 919,429 tons (843,106 tonnes) of the total was shipped through the port of Seward by Suneel Alaska Corp. to the Korean Electric Power Co. (KEPCO) power plant in Honam, South Korea. Eleven Panamex freighters transported the coal from Seward to South Korea. The remaining 720,571 tons (653,700 tonnes) provided fuel for the Fairbanks Municipal Utilities System, the University of Alaska Fairbanks, Fort Wainwright Army Base, Eielson Air Force Base, Golden Valley Electric Association, and Clear Air Force Station. These interior power plants generate about 155 megawatts of electric power. UCM's Korean export agreement benefited greatly from rising international coal prices.

Great Northwest Inc. again mined peat from its pits on College Road in Fairbanks (fig. 24).

SOUTHCENTRAL REGION

Metals

Placer mines produced 35,094 ounces (1,090 kilograms) gold worth $13.86 million in the Southcentral region, compared to 49,723 ounces (1,546 kilograms) gold worth $19.64 million in 1994. The number of active

mines decreased from 19 in 1994 to 10 in 1995 (table 9).

Cambior Alaska Inc. operated the Valdez Creek placer gold mine, about 55 miles (89 kilometers) east of Cantwell. The mine again provided about 150 full-time jobs and produced 32,750 refined ounces (1,018 kilograms) of gold worth $12.9 million from approximately 0.82 million cubic yards (0.66 million cubic meters) of pay gravels. The Valdez Creek placer mine has been Alaska's largest gold producer for 11 of the last 12 years; however, due to exhaustion of reserves, Cambior ceased all mine operations on September 24, 1995. There are no plans to reopen the mine.

Table 14 and figure 25 summarize 12 years of production at the Valdez Creek Gold Mine as derived from DGGS questionnaires mailed in by several mine operators. During the mine's life, some 459,162 ounces (14,279 kilograms) of refined gold or 537,600 ounces (16,719 kilograms) of raw placer gold worth $170.1 million at time of sale were recovered from 5.97 million cubic yards (4.56 million cubic meters) of pay gravels. An estimated 73.45 million cubic yards (56.16 million cubic meters) of overburden were removed from the top of the pay gravels, and the average stripping ratio over the 12 years was 11.2:1. Despite the relative richness of the pay gravels (0.077 ounces gold per cubic yard; 3.128 grams gold per cubic meter), the overall grade of all material moved (overburden+pay gravels) was 0.006 ounces per cubic yard (0.235 grams per cubic meter) of gold. The various operators of the Valdez Creek Placer mine accounted for 18 percent of total Alaska refined gold production during the 12-year period from 1984 to 1995.

Figure 24. *Great Northwest Inc.'s open-pit operation on College Road in Fairbanks. The company sells peat, sand, and sized gravels from the mine site. Great Northwest is the Eastern Interior region's largest producer of peat. Photo by T.K. Bundtzen.*

Table 14. *Summary production data from Valdez Creek placer gold mine 1984–95*[a]

Year	Overburden removed (yd^3)	Processed pay (yd^3)	Stripping ratio	Recovered pay grade (ounces Au/yd^3)[b]	Production refined ounces	Value (at time of sale)[c]
1984	800,000	160,877	5.0:1	0.122	19,627	$7,065,720
1985	1,700,000	355,155	4.8:1	0.084	29,833	9,606,226
1986	5,346,000	223,179	24.9:1	0.112	24,996	9,498,480
1987	4,032,000	224,128	18.0:1	0.094	21,068	9,585,940
1988	5,561,700	370,783	15.0:1	0.120	44,494	18,909,950
1989	6,408,000	462,244	13.8:1	0.135	62,403	22,980,500
1990	1,695,000	124,468	13.6:1	0.094	11,700	3,792,438
1991	7,405,000	487,000	15.2:1	0.088	43,057	15,586,634
1992	11,626,177	915,447	12.7:1	0.094	86,052	28,999,524
1993	10,500,000	613,103	17.1:1	0.058	35,560	12,766,040
1994	11,419,080	1,214,860	9.4:1	0.039	47,622	18,334,470
1995	6,959,375	818,750	8.5:1	0.040	32,750	12,936,250
TOTAL	**73,453,052 (56,162,200 m^3)**	**5,969,994 (4,564,660 m^3)**	**11.2:1**	**0.077 (3.128 g/m^3)**	**459,162 (14,279 kg)**	**$170,062,190**

[a]Data derived from DGGS questionnaires 1984-95.
[b]Based on refined gold recovery; not raw pay grade.
[c]Conservative; does include value of jewelry gold that was attributed to bullion sales by various mine operators.

Since 1987, Cambior Alaska has recontoured and reseeded 1,276 acres (516 hectares) of land that was disturbed by placer mining activities in the Valdez Creek drainage. The tailings ponds collecting mine waters before 1992 were reclaimed as wetlands, and are extensively used by migratory waterfowl. In 1995, Valdez Creek was relocated back into its original position which required construction of about 1 mile (1.6 kilometer) of channel. The final pit is a lake 2,800 feet long by 1,000 feet wide (853 meters by 305 meters) that has been recontoured to make an accessible shoreline (see cover photo of this report). Because of these efforts, the State of Alaska awarded the 1995 Mine Reclamation of the Year Award to Cambior Alaska Inc. In 1994 the same company received the Governor's Safety Recognition Award.

Girdwood Mining Co. was the second largest gold mine in the Southcentral region and the 10th largest gold mine in Alaska during 1995. The operation produces both gold and byproduct gravel from patented claims near Girdwood, about 40 miles (64 kilometers) southeast of Anchorage.

Several small operations reported gold production throughout the Southcentral region. Outsider Mining (John Trautner) mined Canyon Creek on the Kenai Peninsula with a suction dredge, but lost equipment during flooding. Empire Exploration Inc. continued production tests at its Blue Ribbon Mine in the Yentna-Cache Creek district. Lake Creek Placers worked state land on Lake Creek and completed a test cut amounting to about 500 cubic yards (454 cubic meters). Both gold and platinum group elements exist in the pay gravels on Lake Creek. Lake Creek Placers reclaimed most of its previous workings and older ditch lines made by previous operators. Mrak Placer Mine worked Willow Creek in the Hatcher Pass district. Tod Bauer mined Gold Creek in the Valdez Creek district about 30 miles (48 kilometers) south of the Valdez Creek Gold Mine.

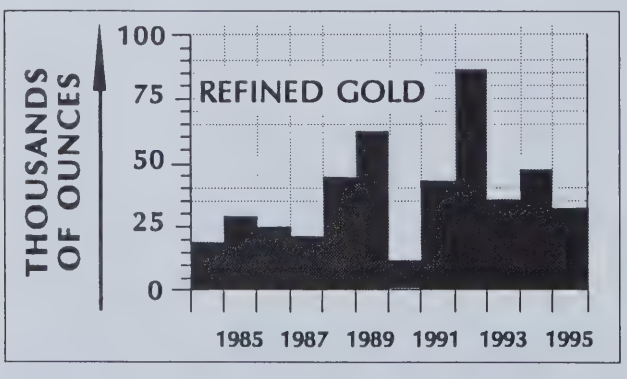


Figure 25. *Amount of refined gold produced at Valdez Creek placer mine (sometimes referred to as Denali placer mine), 1984–95.*

Industrial Minerals

Seventeen firms and agencies reported that 4.18 million tons (3.79 million tonnes) of sand and gravel worth $10.66 million and 89,175 tons (80,900 tonnes) worth $445,875 were mined from quarries and pits throughout the Southcentral region. The 1995 output closely compared to the 1994 levels (Swainbank and others, 1995). The Alaska Railroad hauled 2,680,977 tons (2,432,180 tonnes) from pits in the Palmer–Wasilla area to markets in Anchorage, an increase of 30 percent from the 2,060,429 tons (1,869,220 tonnes) shipped by rail in 1994. These data indicate that road and other construction in the Anchorage bowl area continue to be healthy despite weaknesses in housing and retail markets. Eastwind Inc. completed the largest industrial mineral project in the Anchorage bowl area when they constructed additional storage capacity at the Anchorage land fill.

DOTPF reported rehabilitation of the Glenn Highway, which utilized approximately 251,130 tons (227,830 tonnes) of sand and gravel and 54,800 tons (49,715 tonnes) of riprap and D-1 rock. DOTPF also upgraded the McCarthy airport and worked on various improvements along the Parks Highway.

Chugach Alaska Corp. mined and sold 210,000 tons (190,500 tonnes) of sand and gravel from small borrow pits throughout Southcentral Alaska, mainly to service local communities and timber development projects.

Six small firms reported production of sand and gravel and stone from quarries on the Kenai Peninsula. They include (1) Fairway Gravel Inc. at its Funny River pit south of Seldovia; (2) Beaver Loop Sand and Gravel at Kenai; (3) Tidemark Corp.'s borrow pits at Pedro Bay and Wales; (4) Dibble Creek Rock Inc. at Anchor Point (both gravel and crushed rock); (5) Hopkins Brothers Construction Co. operations in Seldovia (pit-run gravel, sand, D-1, and drain rock); and (6) Lukes Mining Co. gravel pit at Mile 179, Sterling Highway.

Sandvik Enterprises and Hermon Brothers Construction Co. both quarried sand and gravel and septic rock from pits in the Palmer–Wasilla area.

The U.S. Forest Service sold 1,500 tons (1360 tonnes) of blend sand to a local contractor for road construction from the sand pit at 28 Mile Copper River Highway.

Peat

Landscape Supply Corp. excavated about 8,000 cubic yards (6,117 cubic meters) of peat for horticultural applications in the Wasilla area.

SOUTHWESTERN REGION

Metals

The gold mining industry in the Southwestern region declined from 9,650 ounces (300 kilograms) of gold

worth $3.81 million in 1994 to 8,548 ounces (265 kilograms) of gold worth $3.37 million in 1995, a modest reduction of 11 percent (table 9). Thirteen placer mines employed 80 workers throughout the region. One large mine, Nyac Mining Inc. at Bear Creek in the Aniak-Tuluksak district, reduced operations, while the new Clark-Wiltz Partnership on Ganes Creek in the Innoko district reached full production. Long time Innoko district miner Paul Sayer and his two sons mined 10 Pup on Little Creek for about 120 days. Anderson and Son Mining Inc. worked a left limit tributary of Yankee Creek also in the Innoko district on ground leased from Doyon Limited.

The largest operation in southwestern Alaska was the Clark-Wiltz Partnership (CWP), which two years ago purchased patented claims in the Ganes Creek drainage from Magnuson Mining Co. CWP used a crew of 10 to work Podesie Creek, a right limit tributary of Ganes Creek. Some previous operators believed that all the gold in Ganes Creek valley was recycled from older bench gravels and was not derived from tributary streams. The Podesie discovery indicates that placer gold found in the right limit tributaries of Ganes Creek probably came from the mineralized Ganes–Yankee Creek dike swarm to the east.

Other placer mines active in southwestern Alaska during 1995 include Lyman Resources of Alaska at Donlin Creek, Dave Penz at Kako Creek near Marshall, Richard Wilmarth on Chicken Creek in the Iditarod district, Mark Matter on Marvel Creek near Nyac, Chase Brothers Mining on Flat Creek in the Marshall district, Alvin Agoff on Prince Creek in the Iditarod district, Flat Creek Mining on Flat Creek in the Iditarod district, Ed Plano on Anvil Gulch in the Innoko district, Manzie Magnuson on Madison Creek in the Innoko–Tolstoi district, and Robbie Roberts on Ophir Creek in the Innoko district.

Industrial Minerals

Calista Corp. sold 292,500 tons (265,360 tonnes) of sand and gravel to Knik Construction Co. who quarried the material for unspecified contract work in the Southwestern region. Doyon Ltd. prepared 3,460 cubic yards (2,646 cubic meters) of crushed limestone from Noir Quarry for D-1 and basefill road construction applications near McGrath.

ALASKA PENINSULA REGION

Industrial Minerals

Bristol Bay Native Corp. worked with partners Nuna Construction, a wholly owned subsidiary of Choggiung Ltd., and Quality Asphalt Paving to excavate sand and gravel from two large borrow pits in the Dillingham and King Salmon area (figs. 26 and 27). The 341,356 tons (309,680 tonnes) of sand and gravel extracted from both pits was used to relocate the Koliganek airport, provide an aggregate base for the Dillingham Road Project, and reconstruct the South Naknek airport.

SOUTHEASTERN REGION

Metals

Two small placer mines reported gold production from the Southeastern region. Snow Lion Mining Co. excavated a small cut on the Porcupine Creek alluvial fan near Haines, which the company believes shows great promise of being a large low-grade placer gold resource. Coarse gold was found in stratified layers at intermediate depths in the complex fan system. Big Nugget Mine (BNM) processed 10,000 cubic yards (7,646 cubic meters) of auriferous pay also on Porcupine Creek near Haines. BNM averages about six weeks of actual production during the mining season with another

Figure 26. *Bristol Bay Native Corp. worked with Nuna Construction and Quality Asphalt Paving to excavate gravel from the Dillingham-Aleknagik 9. 5 Mile gravel pit for construction of the Dillingham road project. The road work was sponsored by the Bureau of Indian Affairs. Photo courtesy of Bristol Bay Native Corp.*

Figure 27. *Southwest Alaska Contractors' operated a screening plant at 5 Mile gravel pit on the King Salmon-Naknek road system. The plant supplied industrial mineral products for construction at the South Naknek airport. Photo courtesy of Bristol Bay Native Corp.*

six weeks devoted to mobilization and stripping of overburden.

Industrial Minerals

Use of sand and gravel was widespread throughout the Southeastern region, although actual amounts were down from previous years. Juneau Ready Mix Inc. (JRM), also known as Hildre Sand and Gravel Co., was again the largest private sector provider of industrial minerals in the Panhandle. JRM excavated 129,400 tons (117,390 tonnes) for use in construction projects in the Juneau area. RSH Co., another large operator in the Juneau area, provided 110,000 tons (99,790 tonnes) of crushed rock aggregate from its Auke Bay quarry for road bed and industrial applications.

Ron Thomas mined modest amounts of gravel near Hyder during a brief 15-day production season. The cities of Thorne Bay and Skagway sold about 40,000 tons (36,300 tonnes) of shot rock and gravel to unspecified contractors for municipal construction efforts. Quarry reclamation is planned by both communities once the resource is exhausted.

Sealaska Corp. shipped about 700 tons (635 tonnes) of limestone from its quarry near Calder on Prince of Wales Island to circum-Pacific buyers in order to test industrial and other market applications.

DRILLING

The 1995 DGGS questionnaires documented a total drilling footage for the year of 443,055 feet (135,043 meters) (table 15). Of the 415,485 feet (171,120 meters) of hardrock drilling, diamond drilling accounted for 363,690 feet (110,853 meters) and reverse-circulation drilling for 51,795 feet (15,787 meters). The 27,570 feet (8,403 meters) of placer drilling was all exploration work. Table 16 shows drilling footage for 1995 and the previous eight years.

As in the past few years, approximately half the total drilling in the state was done in the Southeastern region (table 17) for development activity, particularly at the Alaska-Juneau and the Greens Creek Mines. Drilling footage for the stripping of coal and placer overburden is reported as footnote "b" in table 17. It is not included in the exploration and development totals in table 17.

PLACER DRILLING

Almost all of the placer drilling was in the Northern region in the Hammond River and Nolan Creek areas, and in the Fairbanks area of the Eastern Interior region. Now that the Alaska Gold Co. has shut down the dredges in Nome, it is unlikely that there will be any more placer thawfield drilling, which was a large component of the placer total until 1992.

HARDROCK DRILLING

Most of the drilling in the Southeastern region was core-drilling rather than reverse circulation. More than 87 percent of that was underground in the Greens Creek and A-J Mines. Core drilling was also the preferred

method in the remote areas of southwestern and northwestern Alaska. But in the Western and the Eastern Interior regions, hardrock exploration drilling used diamond core drilling and reverse circulation equally.

Table 15. *Companies reporting significant drilling programs in Alaska in 1995*

Abacus Mineral Corp.	Kennecott Greens Creek Mining Co.
Alpine Exploration Co.	Newmont Exploration Ltd.
American Copper & Nickel Co.	Placer Dome U.S. Inc.
Cominco Alaska Exploration Inc.	Polar Mining Inc.
Cyprus Amax	Sealaska Corp.
Echo Bay Mines Alaska Inc.	Silverado Mines (U.S.) Inc.
Fairbanks Gold Mining Inc.	Sumitomo Metal Mining Co.
International Freegold Mineral Development Inc.	USMX
Kennecott Exploration Inc.	Westmin Resources Ltd.

Table 16. *Drilling footage reported in Alaska, 1987–95*

	1987	1988	1989	1990	1991	1992	1993[a]	1994	1995[b]
Placer exploration	50,250	152,000	97,250	78,930	51,247	6,740	25,216	21,000	27,570
Placer thawfield	130,000	300,000	210,000	105,000	130,000	65,000	--	--	--
Placer subtotal	**180,250**	**452,000**	**307,250**	**183,930**	**181,247**	**71,740**	**25,216**	**21,000**	**27,570**
Coal subtotal	**19,900**	**26,150**	**38,670**	**18,195**	**16,894**	**12,875**	--	**8,168**	--
Hardrock (core)	95,600	223,630	242,440	648,600	205,805	211,812	124,325	347,018	363,690
Hardrock (rotary)	19,500	130,220	89,790	112,355	110,850	148,022	127,990	91,692	51,795
Hardrock subtotal	**115,100**	**353,850**	**332,230**	**760,955**	**316,655**	**359,834**	**252,315**	**438,710**	**415,485[c]**
TOTAL (feet)	**315,250**	**832,000**	**678,170**	**963,080**	**514,796**	**444,449**	**277,531**	**467,878**	**443,055**
TOTAL (meters)	**96,088**	**253,593**	**206,700**	**293,547**	**156,910**	**135,502**	**84,591**	**141,781**	**135,043**

[a]Does not include 756,000 feet of rotary blast-hole drilling in 1993.
[b]Does not include 500,000+ feet of overburden rotary drilling in 1995.
[c]Includes 187,182 feet of underground coring.
-- Not reported.

Table 17. *Drilling footage by region in Alaska, 1995*

Type of drilling	Northern	Western	Eastern interior	South-central	South-western	Alaska Peninsula	South-eastern	TOTAL
Placer exploration	10,000	3,570	12,000	500	1,500	--	--	**27,570**
Placer thawfield	--	--	--	--	--	--	--	--
Placer subtotal	**10,000**	**3,570**	**12,000**	**500**	**1,500**	--	--	**27,570**
Coal subtotal	--	--	--	--	--	--	--	--
Hardrock core	56,398	30,050	31,204	10,000	18,522	--	217,516	**363,690**
Hardrock rotary	--	19,900	31,895	--	--	--	--	**51,795**
Hardrock subtotal	**56,398**	**49,950**	**63,099**	**10,000**	**18,522**	--	**217,516**	**415,485**
TOTAL (feet)	**66,398**	**53,520**	**75,099**	**10,500**	**20,022**	--	**217,516**	**443,055**
TOTAL (meters)	**20,238**	**16,313**	**22,890**	**3,200**	**6,103**	--	**66,299**	**135,043**

-- Not reported.
Note: 187,182 feet of core-drilling was underground.

METAL AND MINERAL PRODUCT RECYCLING

Although prices for nonferrous scrap remained about the same as the previous year, ferrous scrap prices continued to improve in 1995, which resulted in fundamental improvements in Alaska's metal and mineral product recycling industry. Our survey indicates that 13 firms and one government organization shipped 8,309,651 pounds (3,769,247 kilograms) of nonferrous scrap and 36,200 tons (32,931 tonnes) of ferrous scrap worth $9.11 million to Pacific Rim and Lower 48 markets in 1995, an increase of 54 percent in value and 44 percent in volume from 1994 levels (table 18). Recycling provided an estimated 125 full-time-equivalent jobs throughout Alaska.

Volume of nonferrous scrap output continued to be dominated by Anchorage and Fairbanks based firms. K&K Recycling in Fairbanks continued to lead nonferrous recycling efforts in the Interior region, although the company reported no ferrous scrap shipments in 1995. About 72 percent of the 240.55 tons (218.22 tonnes) of scrap reported shipped by K&K were copper and aluminum products, while the remaining 28 percent consisted of stainless steel, brass, magnesium, manganese, and vehicle radiators. Other Fairbanks-based firms reporting copper and aluminum scrap shipments included C and R Pipe and Steel Inc. and the Fairbanks North Star Borough. Anchorage nonferrous output was again dominated by the Anchorage Recycling Center, which shipped 1,688.85 tons (1,532.30 tonnes) of mainly aluminum and copper scrap to Lower-48 processors. ABC Towing and Alaska Metals Recycling also reported nonferrous scrap shipments during the year.

Lead recycling was brisk and increased from 875 tons (794 tonnes) in 1994 to an estimated 1,553 tons (1,408 tonnes) in 1995, an increase of 77 percent. ABS Alaskan (ABS) was the interior's largest exporter of lead-acid batteries. ABS accepts most private-vendor used batteries as well as material submitted by the Fort Wainwright and Eielson military installations. In 1995, ABS sent thirty-five 40,000-pound-capacity (18,144-kilogram-capacity) tractor trailers loaded with used batteries to G & B Batteries Inc. (G&B) in California, which operates a custom smelter and refining unit

Table 18. *Reported scrap metal and mineral-based recyclable products exported from Alaska, 1994–95*[a]

	1994			1995		
	Quantity		Estimated	Quantity		Estimated
Commodity	pounds	kilograms	value[b]	pound	kilograms	value
Nonferrous scrap						
Aluminum	2,423,669	1,099,376	$1,866,078	3,164,100	1,435,235	$2,400,000
Brass	160,724	72,904	353,593	178,199	80,830	109,818
Copper	678,354	307,701	915,778	1,186,430	538,164	1,601,800
Lead[c]	1,750,000	793,800	612,500	3,105,375	1,408,590	1,055,830
Radiators	15,492	7,027	46,476	21,387	9,701	64,161
Stainless steel	7,510	3,406	37,550	76,160	34,546	342,720
Undistributed nonferrous scrap	- -	- -	- -	578,000	262,181	42,850
Subtotal	**5,035,749**	**2,284,214**	**$3,831,975**	**8,309,651**	**3,769,247**	**5,367,179**
Ferrous scrap	51,046,000	23,154,466	2,083,860	72,600,000	32,931,360	3,484,800
Nonmetallic mineral-based products						
Glass	532,000	241,315	- -	550,000	249,480	- -
Plastic (HDPE#2 and battery case)	20,000	9,072	- -	68,250	30,958	12,500
TOTAL	**56,633,749**	**25,689,067**	**$5,915,835**	**81,527,901**	**36,981,045**	**$9,114,479**

[a]All production data in 1994 and 1995 provided by Alaska Metal Recycling (Anchorage), ABS Alaskan (Fairbanks), ABC Towing (Anchorage), C and R Pipe and Steel Inc. (Fairbanks), Channel Sanitation (Juneau), Action Auto (Fairbanks), Hilltop Wreckers (Chugiak), Anchorage Recycling Center (Anchorage), Fairbanks North Star Borough (Fairbanks), Battery Specialists (Anchorage), BP Exploration (Anchorage), United Battery Services (Portland, Oregon), K&K Recycling (Fairbanks), and Jackovich Construction and Industrial Supply (Fairbanks).

[b]Value estimates for 1994 and 1995 determined from *Metals and Mineral Annual Review - 1995* (Brewis and others, 1996). We emphasize that the price estimates do not include transportaion, preparation, or refining costs.

[c]Lead volume estimates judged to be conservative for both years.

- - Not reported.

specifically designed to handle vehicle batteries. G&B not only recycles all lead but also crushes battery casings for remanufacture and reuses battery acid where applicable. Used battery acid actually exhibits better electrolyte properties and is preferred for use in battery manufacturing over newly created acid. Other Alaskan firms that reported to us recycled lead-acid battery sales include Jackovich Construction and Industrial Supply, NAPA Auto Parts, and Exide Corporation in Fairbanks and Battery Specialists in Anchorage.

Alaskan ferrous scrap exports increased from 25,523 tons (23,154 tonnes) in 1994 to 36,300 tons (32,931 tonnes) in 1995, a 42 percent increase. Improved market prices are driving the brisk Alaska ferrous metal scrap business. Prices increased to an average of $95 per ton ($105 per tonne) at the Tacoma Steel Mill, up from a $60–$80 range in many past years. Alaska Metals Recycling (AMR) of Anchorage accounted for about 62 percent of the Alaska total ferrous scrap output (fig. 28). With a staff of 26, AMR loaded one Panamex freighter with 22,500 tons (20,412 tonnes) of car bodies, surplus military equipment, and worn-out oil-field steel for Taiwan and Korean markets. With nearly 11,000 tons (9,980 tonnes) of compacted cars and other scrap stockpiled for shipment at the end of 1995, AMR anticipates that two freighters will be loaded with ferrous scrap for shipment to Pacific Rim Markets in 1996. AMR obtains ferrous scrap from not only the Anchorage bowl area, but also from the Kenai Peninsula, Southeastern Panhandle, and the Aleutian Chain.

ABC Towing (Rod Lewis) was also very active in the ferrous scrap business and operated several compactors both in Anchorage and in Fairbanks at Action Auto, Miller Salvage, and F&W Star (North Pole). An estimated 5,000 cars were compacted in the North Star Borough by private vendors in 1995, and as many as 15,000 cars may be compacted and shipped in 1996. In 1995 most of the compacted cars were transported to the Lower 48 steel mills on barges owned by Totem Ocean Trailer Express, which operated from the ports of Valdez, Kenai, Anchorage, and Seward.

C and R Pipe and Steel Inc. of Fairbanks recycled 6,000 tons (5,443 tonnes) of compacted cars, drill steel, and miscellaneous scrap from the Fairbanks area and from the North Slope Borough. BP Exploration North Slope scrap metal recycling program recovered 4,600 tons (4,173 tonnes) of steel during 1995, much of which was shipped through agreements worked out with C and R Pipe and Steel Inc. Other ferrous scrap dealers active in Alaska during 1995 included Hilltop Wreckers of Chugiak and Channel Sanitation of Juneau.

Table 19 summarizes the volume and value of scrap metal and mineral-based recyclable products shipped from Alaska during the last nine-years from 1987 to 1995. During this time, an estimated 22,433.6 tons (20,352 tonnes) of nonferrous scrap, 217,914.0 tons (197,914 tonnes) of ferrous scrap, and 1,819.0 tons (1,650 tonnes) of miscellaneous nonmetallic, mineral-based materials worth $56.60 million were shipped to Pacific Rim and North American buyers. Asian industrialized countries have been the main buyers of ferrous scrap during most of the time period. However, increasing volumes of compacted cars are now being shipped to custom steel mills on the U.S. west coast. Lead-acid batteries, which are the source of nearly all recycled lead, have been almost exclusively processed in California. Other nonferrous scrap is marketed throughout North America.

Metal and mineral product recycling has been widely viewed as a much needed environmental cleanup effort. Some recycling activities are subsidized by various industry and government organizations. However, from 1987 to 1995 in Alaska market conditions have driven fluctuations in both volume and value in the recycling industry. Weak international commodity prices caused a significant decrease in both ferrous and nonferrous shipments during 1990–93. Recent rebounds in commodity demand has revitalized Alaska's scrap

Figure 28. *Alaska Metal Recycling Co. Inc. operated Alaska's largest ferrous scrap outlet in Anchorage in 1995. The company uses a Newell shredder (left foreground) to reduce cars and other scrap to fist-sized bits prior to baling for shipment to domestic and overseas markets. Photo by Chris Alexander, Alaska Metal Recycling Co.*

business. Because steel mills and metal fabrication plants in the U.S. midwest are running short of recycled ferrous metal, Alaska's scrap dealers expect more ferrous scrap business in 1996. The state's nonferrous scrap market is also expanding, and this increased business signals growing maturity and growing competition in the industry in coming years.

Table 19. *Quantity and value of reported scrap metal and mineral based recyclable products exported from Alaska, 1987–95*[a]

	In tons						
	Copper[b]	Lead	Aluminum	Undistributed nonferrous[c]	Ferrous	Other[d]	Value[e]
1987	894.8	237.0	583.0	35.0	45,000.0	- -	$8,409,980
1988	756.5	47.2	1,197.3	193.6	14,011.5	300.0	9,514,570
1989	718.8	604.0	1,450.0	877.5	24,000.0	416.9	8,128,200
1990	292.5	1,800.0	750.0	3.2	12,500.0	- -	3,570,000
1991	265.6	1,500.0	670.0	9.2	2,315.4	- -	2,634,650
1992	138.5	- -	222.1	42.8	23,642.3	- -	3,052,908
1993	346.7	850.9	1,263.3	11.5	31,828.4	517.0	6,257,850
1994	419.5	875.0	1,211.8	11.5	28,316.9	276.0	5,915,835
1995	682.3	1,552.7	1,582.1	337.7	36,300.0	309.1	9,114,479
TOTAL (tons)	**4,515.2**	**7,466.8**	**8,929.6**	**1,522.0**	**217,914.5**	**1,819.0**	**$56,598,472**
(metric tonnes)	**4,096.2**	**6,773.9**	**8,100.9**	**1,380.7**	**197,692.0**	**1,650.2**	

[a]Derived from published DGGS Alaska Mineral Industry Special Report series 1987–95.
[b]Includes brass.
[c]Includes nickel-cobalt alloys, zinc, car radiators, manganese, magnesium, and stainless steel.
[d]Includes glass, battery casing, and plastic.
[e]Gross values determined from average commodity prices for respective years.
- - Not reported.

GOVERNMENT ACTION

Several pieces of legislation favorable to the mining industry were suggested by the Alaska Minerals Commission in its 1995 report, and some were signed into law by Governor Knowles (fig. 29).

House Bill 128 allows the discharge of small amounts of drill fluids or solids onto state lands without an individual permit. This technical change to the Alaska Statute 46.03.100 answered a problem which had surfaced the previous year, when the State Department of Environmental Conservation had selectively applied the requirement to the mining industry at the request of environmental groups. Regulations pursuant to the statute were so broad as written that any discharges such as bilge-pumping or ditching would have required a special permit.

House Bill 197, the Mining Incentives Bill, was signed by the Governor in Fairbanks on June 20, 1994. It allows up to 100 percent of exploration expenditures, to a maximum of $20 million, to be deducted from up to 50 percent of the annual royalties and Mining License Tax over a 15-year period when a mine begins operation. It also calls for all qualifying exploration information to be turned over to the state (table 20).

At the request of the Fairbanks Industrial Development Corp. the legislature appropriated $400,000 for aeromagnetic and electromagnetic surveys in the Rampart-Manley area west of Fairbanks during the summer of 1995. Flying was done in September 1995. The results were released March 4, 1996, (Alaska Division of Geological & Geophysical Surveys, 1996) but some staking of prospecting sites was noted during the summer of 1995.

The U.S. Bureau of Mines was dissolved in 1995 by the U.S. Congress. It had been active in Alaska mining for more than 80 years, with field offices in Juneau, Anchorage, and Fairbanks. The Bureau's Alaska work ranged from coal to strategic minerals to placer deposits. In recent years Bureau Mining District studies helped spur mineral exploration in southeast and southcentral Alaska. Furthermore, projects undertaken by Bureau research centers assisted Alaska placer miners develop more efficient and environmentally safe mining methods

and aided hardrock miners such as Greens Creek with secondary blasting problems. The USBM, through applied research, attempted to mitigate many environmental issues facing the nation's metal and mineral product recycling industry. Although the Bureau of Mines was officially closed by executive order on January 19, 1996, its presence in Alaska will persist. All members of the Bureau staffs in Juneau and Anchorage were transferred to the U.S. Bureau of Land Management (BLM). Their BLM function will be specific to mineral assessment on federal lands. Hopefully the Bureau's institutional memory and databases should remain in Alaska for the foreseeable future and therefore be readily available for consultation and use by the mineral industry.

Proposed changes to the General Mining Law of 1872 in Congress and the requirement to pay $100 per 20-acre claim has reduced the number of active federal mining claims throughout Alaska. Many holders are converting federal claims to State claims.

On a positive note, the federal Environmental Protection Agency is now considering submarine tailings disposal as an option for mines located near tidewater in southeastern Alaska after reviewing material collected by the U.S. Bureau of Mines over the last several years. Studies of submarine tailings disposal at the Island Copper Mine on Vancouver Island, Canada, influenced the recent EPA consideration in the decision (Baer and others, 1992).

Figure 29. *Members of the Alaska Minerals Commission and staff at the Fort Knox Mine, September 1995. Left to right: Al Clough, staff, Alaska Minerals Commission (AMC); Jules Tileston, Director, Division of Mining and Water Management; Dick Swainbank, staff, AMC; Joe Fisher, AMC; Irene Anderson, AMC; Ken Pohle, president, Fairbanks Gold; Karl Hanneman, AMC; Don Stevens, AMC; Leo Mark Anthony, AMC; and Ron Sheardown, AMC. Photo by Dr. Earl Beistline, chairman, AMC.*

Table 20. *Revenues paid to the State of Alaska by Alaska's mineral industry, 1991–95*[a]

	1991	1992	1993	1994	1995
Mineral rents and royalites					
State claim rentals	$626,164	$537,355	$523,661	$709,568	$712,559
Production royalties	11,736	7,815	7,917	12,015	6,762
Mining license	598,971	465,153	425,607	481,907	484,035
Subtotal	**1,236,871**	**1,010,323**	**957,185**	**1,203,490**	**1,203,356**
Coal rents and royalties					
Royalties	1,188,063	1,294,825	1,486,100	1,399,912	1,866,952
Rents	130,363	198,835	198,835	198,835	172,024
Subtotal	**1,318,426**	**1,493,660**	**1,684,935**	**1,598,747**	**2,038,976**
Material sales					
Mental Health	34,141	104,845	5,300	54,772	106,505
Division of Land	706,220	491,235	561,414	174,484	351,094
SPCO	0	161,408	150,000	136,752	115,744
School fund	3,548	3,279	3,011	1,564	8,812
Subtotal	**743,909**	**760,767**	**719,725**	**367,572**	**582,155**
TOTAL	**$3,299,206**	**$3,264,750**	**$3,361,845**	**$3,169,809**	**$3,824,487**

[a]Does not include state corporate income taxes, which were not released for this study, or taxes paid to individual municipalities.

RECLAMATION

In 1994 the State Division of Mining & Water Management (DMWM) initiated a new program specifically to give public recognition to Alaska's placer miners for the diligent reclamation work on many of the creeks in Alaska that have been disturbed by placer mining for gold. As much as 95 percent of these creeks have been previously mined, and most have been mined almost continuously since the late 1890s or early 1900s.

State law requires miners to "conduct a mining operation in a manner that prevents unnecessary and undue degradation of land and water resources" (AS.27.0200), and when mining is completed, return the mined ground to a stable configuration that will prevent erosional degradation and promote rapid recolonization by native plant species (AS 27.19.010, 030, 100; sections 11.097.0100, 0200, and section 2, chapter 92, SLA 1900). In addition, reclamation of mined ground must be compatible with projected future uses of the land. This requires planning for the reclamation results while organizing the mining plan of operations prior to actual mining.

Reclamation of ground disturbed by mining has been required by law on federal mining claims since 1981. The U.S. Bureau of Land Management (BLM) manages reclamation activity on federal land. Alaska adopted its own reclamation statutes which became effective on October 15, 1991. DMWM manages and provides guidance for mine reclamation on state mining claims and on private land.

DMWM also maintains a statewide bond pool that provides a reclamation bonding mechanism for state, private, and federal mining operations disturbing five acres or more. Under the State Reclamation Statutes and Regulations, the land must be recontoured to blend naturally with the local topography using the materials removed during mining, and covered with available stockpiles of organic material and soil wherever possible. The creek must be relocated in the lowest part of the stream valley and provided with a bed of washed tailings and oversize material (when available materials permit), at a stable gradient, with a flood plain broad enough to accommodate severe seasonal high water events.

Guidelines described above tell the miner what the reclamation goal is, but allow flexibility in the method used. While placer mining in general shares similar methods of excavation and recovery, each mining operation is unique in its ground conditions, the varieties and distribution of the materials that must be moved, the hydrologic profile of the creek and its environs, and the kinds and sizes of equipment used to mine and reclaim the ground. Every mining operation also demands constant adjustment and readjustment to unpredictable changes in ground and water conditions.

Successful reclamation demands a thorough understanding of the behavior of the earth and water at each unique site, and a responsible approach to rehabilitating the creek and adjacent land. The miners who received the Reclamation Awards in 1994 and 1995 demonstrated skill and creativity guided by responsible custodianship of the land.

The presentation of just five reclamation awards in 1994 does not imply that only five mining companies completed reclamation work worthy of recognition. In the first year of selection, only five well-documented cases were considered. The 1994 recipient of the Outstanding Reclamation Award was John "Bud" McClain for mine closure work on Ester Creek, Fairbanks mining district. The four Excellent Reclamation awards were given to Douglas Clark, Middle Fork of the Chena River, Fairbanks mining district; Jack and Greg Neubauer, Fox Creek, Fairbanks mining district; Al Hopen, Little Eldorado Creek, Fairbanks mining district (figs. 30 and 31); and John Brown, North Fork Harrison Creek, Circle mining district.

Nominations for the Second Annual Reclamation Awards were received from the DGGS, DMWM, and private citizens. In November 1995, the awards ceremony was held at the Anchorage Sheraton Hotel during the Alaska Miners Association Convention. Alaska Department of Natural Resources Commissioner John Shively presented seven plaques to the following mining companies for excellent reclamation: Thomas Faa, Eva Creek, Bonnifield mining district; Mark Funk, Munson Creek, Fairbanks mining district; Edward Salter, Pioneer Creek, Hot Springs mining district; Thurman Oil and Mining, Rhode Island Creek, Hot Springs mining district (fig. 32); True North Joint Venture (trench reclamation), Pedro Dome, Fairbanks mining district; Tim Kiehl, Gold King Creek, Bonnifield mining district; and Douglas Baker, Hope Creek, Circle mining district.

In addition to the seven award for excellence, four placer mining firms were recipients of the First Annual Governors Awards for Reclamation. The governors awards were presented to miners or operators whose reclamation went beyond excellent, to the level of outstanding. The recipients in 1995 were Robert Keller, Totatlanika River, Bonnifield mining district; Sphinx America, Monument Creek and Midnight Creek, Ruby mining district; Cambior, Alaska, Valdez Creek, Valdez

Figure 30. *View of Alf Hopen's placer mining operation on Last Chance Creek, tributary to the Little Eldorado Creek in the early 1990s while mining was in progress. Photo by K.M. Charlie.*

Figure 31. *Karen Clautice, DGGS and Dick Swainbank, DTD, examine reclamation of same scene as depicted in figure 31 at Last Chance Creek tributary to Eldorado Creek, Fairbanks district. Photo by T.K. Bundtzen.*

Figure 32. *Jay Hodges accepts an award for Thurman Oil and Mining Inc. for excellent reclamation work on Rhode Island Creek in the Hot Springs district. DNR Commissioner John Shively presented four awards for outstanding and seven for excellent reclamation work. Kathie Charlie, center, is manager of the post-mine reclamation work for the Alaska Division of Water & Mining Management. The recognition was given to the miners at the Alaska Mining Association annual convention in November 1995. Photo by Ryan Hull.*

Creek mining district; and Ronald Engstrom, Basin Creek, Nome mining district.

All recipients of both the 1994 and 1995 reclamation awards received letters acknowledging them for their efforts to minimize the potential for future degradation of the land through erosion, for providing an excellent medium for rapid regrowth of local plant species, for good planning for future uses of the land, and for returning the mined land to a condition that is not only environmentally stable, but also esthetically pleasing to view.

Since the initiation of the Reclamation Award Concept, there have been many inquiries about the procedure for nominating deserving miners and operators. All commercial mine owners or operators on state, federal, or private land in Alaska are eligible. Anyone can nominate a candidate for a reclamation award, including the owners or operators themselves, friends, employees, complete strangers who are impressed with what they see, and state or field inspectors. The reclamation work must have been completed within the three mining seasons preceding the nomination. The work must have been inspected by the Division of Mining & Water Management field inspector (on state mining claims or private land), or a U.S. Bureau of Land Management field inspector, and signed off as satisfactorily completed. There also must be visual documentation of the work, either video tape or still photographs, submitted with the nomination.

The nominees are judged by a small panel of federal and state agency people who have extensive knowledge of and exposure to Alaska mining reclamation. The criteria used for judging are the Alaska Reclamation Standards and statutory requirements for state and private claims, and the Federal Reclamation Standards and regulations for federal mining claims. Points are awarded for close adherence to the approved reclamation plan and for fulfilling the intent of the law. They are also judged on ingenuity and creativity in problem solving where particularly difficult ground and/or water conditions existed, or for innovative engineering to solve a problem. And, or course, it helps if the site looks nice when complete, although that is not required by either state or federal law.

For more information about the Alaska Placer Mine Reclamation Awards, contact program coordinator Kathy Charlie at the Alaska Division of Mining & Water Management, 3700 Airport Way, Fairbanks, Alaska 99709, or call (907) 451-2791 weekdays, 8:30 a.m. to 5:00 p.m.

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U.S. Customary Units/Metric Units Conversion Chart

To convert from:	To:	Multiply by:
Weight/Mass		
ounces (avoirdupois)	grams	28.350
ounces (troy)	grams	31.1035
pounds	kilograms	0.4536
short tons	metric tons	0.9072
grams	ounces (avoirdupois)	0.03527
	ounces (troy)	0.03215
kilograms	pounds	2.2046
metric tons	short tons	1.1023
Length		
miles	kilometers	1.6093
yards	meters	0.9144
feet	meters	0.3048
	centimeters	30.48
	millimeters	304.80
inches	centimeters	2.54
	millimeters	25.4
kilometers	miles	0.6214
meters	yards	1.0936
	feet	3.2808
millimeters	feet	0.00328
	inches	0.03937
centimeters	inches	0.3937
Area		
square miles	square kilometers	2.590
acres	square meters	4,046.873
	hectares	0.4047
square yards	square meters	0.8361
square feet	square meters	0.0929
square inches	square centimeters	6.4516
	square millimeters	645.16
square kilometers	square miles	0.3861
square meters	acres	0.000247
	square feet	10.764
	square yards	1.196
hectares	acres	2.471
	square meters	10,000.00
square centimeters	square inches	0.155
square millimeters	square inches	0.00155
Volume		
cubic yards	cubic meters	0.7646
cubic feet	cubic meters	0.02832
cubic inches	cubic centimeter	16.3871
cubic meters	cubic yards	1.3079
	cubic feet	35.3145
cubic centimeters	cubic inches	0.06102
gallons (U.S.)	liters	3.7854
liters	gallons (U.S.)	0.2642
milliliters	ounces (fluid)	0.03381
ounces (fluid)	milliliters	29.5735

Temperature conversions:
From degrees Fahrenheit to degrees Celsius, subtract 32 and multiply by 5/9.
From degrees Celsius to degrees Fahrenheit, multiply by 9/5 and add 32.

SOURCE: *Minerals Today,* February 1993, U.S. Bureau of Mines.

APPENDIX A

Total active claims and new claims staked in 1993, 1994, and 1995[a] (listed by quadrangle)[b]

Compiled by Erik Hansen[c] and Denise Herzog-Cook[d]

	Quadrangle	Active claims assessment work 1993	1994	1995	New claims staked Federal 1993	1994	1995	State 1993	1994	1995	Total active claims[e] 1993	1994	1995
17	Point Hope	0	0	28	0	0	0	0	0	0	**0**	**0**	**28**
18	De Long Mts.	661	760	826	0	0	0	0	144	28	**661**	**904**	**854**
23	Philip Smith Mts.	2	1	1	0	0	0	0	0	0	**2**	**1**	**1**
26	Noatak	0	0	0	0	0	0	0	0	61	**0**	**0**	**61**
27	Baird Mts.	7	7	7	0	0	1	0	0	18	**7**	**7**	**26**
28	Ambler River	71	68	238	0	0	0	5	189	95	**76**	**257**	**333**
29	Survey Pass	34	34	34	0	0	0	0	0	0	**34**	**34**	**34**
30	Wiseman	962	851	823	278	39	20	5	55	34	**1,245**	**945**	**877**
31	Chandalar	394	270	265	9	9	12	16	21	502	**419**	**300**	**775**
32	Christian	1	0	0	0	0	0	0	0	0	**1**	**0**	**0**
35	Kotzebue	28	28	28	0	0	0	15	0	4	**43**	**28**	**32**
36	Shungnak	0	0	5	0	0	0	0	0	0	**0**	**0**	**5**
38	Hughes	54	54	54	0	0	0	0	0	0	**54**	**54**	**54**
39	Bettles	136	12	11	10	15	7	0	6	4	**146**	**33**	**22**
43	Teller	258	143	104	0	0	0	0	0	42	**258**	**143**	**146**
44	Bendeleben	530	401	416	0	0	0	13	4	31	**543**	**405**	**447**
45	Candle	313	351	167	0	0	0	4	11	21	**317**	**362**	**188**
47	Melozitna	49	65	52	0	0	0	24	6	4	**73**	**71**	**56**
48	Tanana	929	550	656	0	0	0	70	177	53	**999**	**727**	**709**
49	Livengood	3,049	2,955	3,315	33	0	0	153	146	545	**3,235**	**3,101**	**3,860**
50	Circle	2,440	2,675	2,630	0	0	0	477	256	413	**2,917**	**2,931**	**3,043**
51	Charley River	178	32	32	0	0	0	0	0	0	**178**	**32**	**32**
52	Nome	67	115	281	4	0	0	11	43	168	**82**	**158**	**449**
53	Solomon	117	216	249	0	0	0	8	56	39	**125**	**272**	**288**
54	Norton Bay	0	0	25	0	0	0	0	0	25	**0**	**0**	**50**
55	Nulato	1,591	1,588	27	0	0	0	5	0	0	**1,596**	**1,588**	**27**
56	Ruby	668	444	394	0	0	0	27	29	12	**695**	**473**	**406**
57	Kantishna River	44	44	44	0	0	0	0	0	14	**44**	**44**	**58**
58	Fairbanks	2,260	2,670	2,313	0	0	0	195	143	364	**2,455**	**2,813**	**2,677**
59	Big Delta	2,902	2,652	3,187	0	0	0	213	408	421	**3,115**	**3,060**	**3,608**
60	Eagle	968	1,048	893	0	0	0	170	171	116	**1,138**	**1,219**	**1,009**
64	Ophir	362	290	294	0	0	0	15	109	8	**377**	**399**	**302**
65	Medfra	254	285	226	0	0	0	2	30	0	**256**	**315**	**226**
66	Mt. McKinley	273	93	138	0	0	0	2	0	0	**275**	**93**	**138**
67	Healy	1,629	1,228	1,109	0	0	0	90	195	335	**1,719**	**1,423**	**1,442**
68	Mt. Hayes	1,207	1,049	1,271	0	12	171	80	163	858	**1,287**	**1,224**	**2,300**
69	Tanacross	374	316	160	0	0	0	14	18	69	**388**	**334**	**229**
72	Holy Cross	6	6	0	0	0	0	0	0	0	**6**	**6**	**0**
73	Iditarod	222	262	329	6	0	0	0	13	223	**228**	**275**	**552**
74	McGrath	75	75	75	0	0	0	0	0	0	**75**	**75**	**75**
75	Talkeetna	869	728	724	0	0	3	68	120	48	**937**	**848**	**775**
76	Talkeetna Mts.	514	525	386	0	0	0	61	45	48	**575**	**570**	**434**
77	Gulkana	3	3	2	0	0	0	2	0	0	**5**	**3**	**2**
78	Nabesna	191	96	53	0	0	0	0	0	0	**191**	**96**	**53**
81	Russian Mission	40	40	41	0	0	0	0	0	0	**40**	**40**	**41**
82	Sleetmute	109	122	124	0	0	0	0	8	22	**109**	**130**	**146**
83	Lime Hills	12	14	0	0	0	0	0	2	8	**12**	**16**	**8**
84	Tyonek	4,713	2,112	539	0	0	0	67	0	8	**4,780**	**2,112**	**547**
85	Anchorage	441	367	410	0	3	0	64	56	79	**505**	**426**	**489**

[a]Total count based on all documents recorded through January 1, 1996.
[b]Quadrangles numbered northwest to southeast according to DGGS-DOM numbering and Kardex systems.
[c]Land Status Specialist, P.O. Box 97, Ester, Alaska, 99725.
[d]Ryan Lode Mines Inc., 2173 University Avenue, Suite 101, Fairbanks, Alaska 99709.
[e]Excluding an undetermined number of claims on state-selected land.
NOTE: 75,546.3 acres of upland leases are not included in this tabulation. Many of the claims in Quadrangle 55 (Nulato) are now under lease.

APPENDIX A—Continued

	Quadrangle	Active claims assessment work 1993	1994	1995	New claims staked Federal 1993	1994	1995	State 1993	1994	1995	Total active claims 1993	1994	1995
86	Valdez	25	41	24	0	0	0	0	2	20	**25**	**43**	**44**
87	McCarthy	209	132	139	0	0		0	0	0	**209**	**132**	**139**
91	Bethel	35	48	49	0	0	0	4	1	0	**39**	**49**	**49**
92	Taylor Mts.	90	94	94	0	0	0	0	0	5	**90**	**94**	**99**
93	Lake Clark	335	335	195	0	0	0	0	66	0	**335**	**401**	**195**
94	Kenai	12	3	0	0	0		0	0	0	**12**	**3**	**0**
95	Seward	157	586	565	95	51	58	13	32	21	**265**	**669**	**644**
97	Bering Glacier	390	152	115	0	0	0	0	1	0	**390**	**153**	**115**
102	Dillingham	0	0	354	0	0	0	0	219	4	**0**	**219**	**358**
103	Iliamna	631	650	617	0	0	0	0	0	1	**631**	**650**	**618**
104	Seldovia	10	7	2	0	0	0	0	2	0	**10**	**9**	**2**
107	Icy Bay	0	10	0	0	0	0	14	0	0	**14**	**10**	**0**
108	Yakutat	1	1	0	0	0	0	0	0	0	**1**	**1**	**0**
109	Skagway	430	392	471	1	1	2	99	318	36	**530**	**711**	**85**
111	Mt. Fairweather	2	2	2	0	0	0	0	0	0	**2**	**2**	**2**
112	Juneau	1,399	1,509	1,181	76	27	63	20	3	10	**1,495**	**1,539**	**1,254**
114	Sitka	57	47	76	8	39	2	0	0	2	**65**	**86**	**80**
115	Sumdum	75	4	0	0	0	0	0	0	0	**75**	**4**	**0**
116	Port Alexander	0	0	1	0	1	0	0	0	0	**0**	**1**	**1**
117	Petersburg	180	193	147	19	1	23	0	0	0	**199**	**194**	**170**
118	Bradfield Canal	45	33	32	0	0	0	0	0	0	**45**	**33**	**32**
119	Craig	405	671	503	62	89	14	8	1	0	**475**	**761**	**517**
120	Ketchikan	114	158	114	0	0	0	0	0	0	**114**	**158**	**114**
121	Dixon Entrance	61	86	58	0	9	0	0	2	0	**61**	**97**	**58**
123	Hagemeister Island	196	196	196	0	0	0	0	0	0	**196**	**196**	**196**
127	Afognak	2	1	2	0	45	0	0	0	32	**2**	**46**	**34**
133	Chignik	22	10	43	0	0	0	0	0	0	**22**	**10**	**43**
135	Trinity Islands	92	79	11	0	0	0	8	1	38	**100**	**80**	**49**
138	Port Moller	0	11	6	0	0	0	0	93	0	**0**	**104**	**6**
TOTAL		**34,982**	**31,096**	**27,983**	**601**	**341**	**376**	**2,042**	**3,365**	**4,889**	**37,625**	**34,802**	**33,248**

APPENDIX B

1995 Prospecting sites on State lands

Compiled by Erik Hansen[a] and Denise Herzog-Cook[b]

Quadrangle		New sites	Extensions	Total
17	Point Hope	9	0	**9**
19	Mishuguk Mtn.	0	0	**0**
26	Noatak	16	0	**16**
27	Baird Mtns.	6	0	**6**
30	Wiseman	10	0	**10**
31	Chandalar	2	5	**7**
44	Bendeleben	5	4	**9**
45	Candle	5	0	**5**
47	Melozitna	0	0	**0**
48	Tanana	54	15	**69**
49	Livengood	324	38	**362**
50	Circle	169	85	**254**
52	Nome	45	10	**55**
53	Solomon	19	1	**20**
58	Fairbanks	85	17	**102**
59	Big Delta	45	33	**78**
60	Eagle	34	7	**41**
64	Ophir	0	0	**0**
65	Medra	3	0	**3**
67	Healy	12	0	**12**
68	Mt. Hayes	2	12	**14**
69	Tanacross	6	166	**172**
74	McGrath	6	0	**6**
75	Talkeetna	14	3	**17**
76	Talkeetna Mtns.	41	40	**81**
83	Lime Hills	0	0	**0**
84	Tyonek	0	0	**0**
85	Anchorage	16	9	**25**
86	Valdez	13	0	**13**
95	Seward	1	0	**1**
103	Iliamna	0	0	**0**
109	Skagway	0	0	**0**
135	Trinity Islands	1	2	**3**
TOTAL		**943**	**447**	**1,390**

[a]Land Status Specialist, P.O. Box 97, Ester, Alaska 99725.
[b]Ryan Lode Mines Inc., 2173 University Avenue, Suite 101, Fairbanks, Alaska 99709.

APPENDIX C

State and federal agencies and private interest groups involved in mineral development activities, 1995

(Note: The *1996 Service Directory of the Alaska Miners Association* lists technical and professional consultants and companies available for work in Alaska. The report is available for $12 from the Association's Anchorage office.)

STATE OF ALASKA AGENCIES

DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT
State Office Building, 9th Fl.
P.O. Box 110800 (mailing)
Juneau, AK 99811-0800
(907) 465-2500
(907) 465-3767 (fax)

Function: *Promotes economic development in Alaska.*

Division of Trade and Development
3601 C St., Ste. 700
Anchorage, AK 99503-5934
(907) 269-8110
(907) 269-8125 (fax)

State Office Building, 9th Fl.
P.O. Box 110804 (mailing)
Juneau, AK 99811-0804
(907) 465-2017

751 Old Richardson Hwy., Ste. 205
Fairbanks, AK 99701
(907) 452-7464
(907) 456-8173 (fax)

Function: *Primary advocacy agency in state government for economic growth. Researches and publishes economic data on Alaska's mining industry. Attracts capital investment by advertising Alaska's resource potential. Provides research staff aid for the Alaska Minerals Commission. The Division also encourages the development of new markets for Alaska resources; increases the visibility of Alaska and its products in the international marketplace; and makes referrals and provides technical assistance to those interested in developing export markets for Alaska-produced or value-added goods and services.*

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
410 Willoughby Ave., Ste. 105
Juneau, AK 99801-1795
(907) 465-5010
Public Information (907) 465-5060

Function: *Issues permits for activities, including mining, that affect air or water quality or involve land disposal of wastes. Sets air- and water-quality standards. Inspects, monitors, and enforces environmental quality statutes, regulations, and permits. Reviews all federal permits.*

ADEC - Northern Public Service Area
610 University Ave.
Fairbanks, AK 99709-3643
(907) 451-2184
(907) 451-2172

ADEC - Central Public Service Area
555 Cordova St.
Anchorage, AK 99501
(907) 269-7500
Permits/Compliance Assistance
1-800-510-2332 (inside Alaska only)
(907) 269-7500 (outside Alaska)

ADEC - Juneau Public Service Area
410 Willoughby Ave., Ste. 105
Juneau, AK 99801-1795
(907) 465-5350

Nome District Office
P.O. Box 1815
Nome, AK 99762-1815
(907) 443-2600
(907) 443-5961(fax)

DEPARTMENT OF FISH AND GAME
1255 W. 8th St.
P.O. Box 25526 (mailing)
Juneau, AK 99802-5526
(907) 465-4100

Habitat and Restoration Division
(907) 465-4105

Function: *Protects habitat in fish-bearing fresh waters and manages refuges, sanctuaries, and critical habitats. Requires permits for any work involving: the blockage of fish passage; equipment crossings or operation in fresh waters used by anadromous fish; use, diversion, or pollution of streams containing anadromous fish; construction, exploration, or development work in state game refuges, game sanctuaries, and critical habitat areas.*

Northern Regional Office
Habitat and Restoration Division
1300 College Rd.
Fairbanks, AK 99701-1599
(907) 459-7289

Southcentral Regional Office
Habitat and Restoration Division
333 Raspberry Rd.
Anchorage, AK 99518-1599
(907) 267-2285

Southeastern Regional Office
Habitat and Restoration Division
802 3rd St., 2nd Fl.
P.O. Box 240020 (mailing)
Douglas, AK 99824-0020
(907) 465-4290

OFFICE OF MANAGEMENT AND BUDGET
Division of Governmental Coordination
240 Main St., Ste. 500
P.O. Box 110030 (mailing)
Juneau, AK 99811-0030
(907) 465-3562

Function: *Conducts coordinated state review of permits for mining projects within Alaska's Coastal Management Zone. Provides information to applicants on project design for consistency with the policies and standards of the Alaska Coastal Management Program. Coordinates state response to direct federal actions, including proposed regulations, that affect Alaska's mining industry.*

Southcentral Regional Office
3601 C St., Ste. 370, Frontier Bldg.
Anchorage, AK 99503-5930
(907) 561-6131
(907) 561-6134 (fax)

Southeastern Regional Office
240 Main St., Ste. 500
P.O. Box 110030 (mailing)
Juneau, AK 99811-0030
(907) 465-3562

DEPARTMENT OF NATURAL RESOURCES
400 Willoughby Ave., 5th Fl.
Juneau, AK 99801-1724
(907) 465-2400

Division of Forestry
3601 C St., Ste. 1034, Frontier Bldg.
Anchorage, AK 99503-5937
(907) 269-8463

Function: *Establishes guidelines to manage mining in state forests.*

Interior Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2660

Coastal Regional Office
400 Willoughby Ave., 3rd Fl.
Juneau, AK 99801-1724
(907) 465-2491

Division of Geological & Geophysical Surveys
794 University Ave., Ste. 200
Fairbanks, AK 99709-3645
(907) 451-5000
(907) 451-5050 (fax)

Function: *Conducts geological and geophysical surveys to determine the potential of Alaska land for production of metals, minerals, fuels, and geothermal resources; locations and supplies of construction materials; potential geologic hazards to buildings, roads, bridges, and other installations and structures; and other surveys and investigations as will advance knowledge of the geology of Alaska and general geologic inventories. Publishes a variety of reports that contain the results of these investigations. Advises the public and government agencies on geologic issues. Maintains a library of geologic bulletins, reports, and periodicals. Maintains a drill-core storage facility at Eagle River.*

Geologic Materials Center
P.O. Box 772805
Eagle River, AK 99577-2805
(907) 696-0079

Division of Land
3601 C St., Ste. 1122, Frontier Bldg.
Anchorage, AK 99503-5947
(907) 269-8503
(907) 269-8904 (fax)

Function: *Manages surface estate and resources, including materials (gravel, sand, and rock). Handles statewide and regional land-use planning. Issues leases, material-sale contracts, mill-site permits, land-use permits, and easements for temporary use of State land and access roads.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2700
(907) 451-2751 (fax)

Southcentral Regional Office
3601 C St., Ste. 1080, Frontier Bldg.
Anchorage, AK 99503-5937
(907) 269-8552
(907) 269-8913 (fax)

Southeastern Regional Office
400 Willoughby Ave. 4th Fl.
Juneau, AK 99801-1724
(907) 465-3400
(907) 586-2954 (fax)

Division of Mining & Water Management
3601 C St., Ste. 800, Frontier Bldg.
Anchorage, AK 99503
(907) 269-8624

A. Mining

Function: *Principal agency for management of mining and reclamation on state land in Alaska. Maintains a mining information office in Fairbanks. Issues property rights to leasable minerals; adjudicates locatable mineral filings. Issues permits for hard-rock and placer-mining activity. Maintains records of mineral locations, permits, and leases. Provides technical, legal, and land-status information. Administers the Alaska Surface Mining Control and Reclamation Act (ASMACRA), which includes permitting and inspection of coal mining activity and reclamation of abandoned mines.*

B. Water Management

Function: *Manages water resources of the state; issues water-appropriation permits and certificates; responsible for safety of all dams in Alaska; conducts surveys to determine the locations, quantity, and quality of ground and surface water.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2790 (Mining)
(907) 451-2772 (Water)

Southeastern Regional Office
400 Willoughby, 4th Fl.
Juneau, AK 99801
(907) 465-3400

Division of Parks and Outdoor Recreation
3601 C St., Ste. 1200, Frontier Bldg.
Anchorage, AK 99503-5921
(907) 762-2600

Function: *Manages approximately 3,000,000 acres of state park lands primarily for recreational uses, preservation of scenic values, and watershed. Responsible for overseeing mining access, recreational mining activity, and valid mining-claim holdings within state park lands.*

Northern Regional Office
3700 Airport Way
Fairbanks, AK 99709-4699
(907) 451-2695

Southcentral Regional Office
3601 C St., Ste., 1280, Frontier Bldg.
Anchorage, AK 99510-7001
(907) 762-2616

Southeastern Regional Office
400 Willoughby Ave., 4th Fl.
Juneau, AK 99801-1724
(907) 465-4563

History and Archaeology Section
3601 C St., Ste. 1278, Frontier Bldg.
Anchorage, AK 99503-5921
(907) 762-2626

DEPARTMENT OF PUBLIC SAFETY
450 Whittier St.
P.O. Box 111200 (mailing)
Juneau, AK 99811-1200
(907) 465-4322

Division of Fish and Wildlife Protection
5700 East Tudor Rd.
Anchorage, AK 99507-1225
(907) 269-5509

Function: *Enforces state laws, in particular AS Title 16. Acts as enforcement arm for Alaska Department of Fish and Game. Protects Alaska's fish and wildlife resources through enforcement of laws and regulations governing use of natural resources within Alaska. These laws are in Alaska Statutes 08, 16, 46, and Alaska Administrative Code's 05, 12, and 20.*

DEPARTMENT OF REVENUE
State Office Bldg.
11th Fl., Entrance A
P.O. Box 110400 (mailing)
Juneau, AK 99811-0400
(907) 465-2300

Income and Excise Audit Division
State Office Bldg.
11th Fl., Entrance B
P.O. Box 110420 (mailing)
Juneau, AK 99811-0420
(907) 465-2320
(907) 465-2375 (fax)

Function: *Issues licenses for mining, production, and sale of minerals. Administers mining-license tax based on net income, including royalties. New mining operations—except sand and gravel mining—can apply for and receive certificates of tax exemption for the first 3½ years of operation. (Tax returns must be filed annually.)*

UNIVERSITY OF ALASKA
Fairbanks, AK 99775-5780

College of Natural Sciences
Department of Geology & Geophysics
308 Natural Sciences Bldg.
(907) 474-7565

Function: *Provides undergraduate and graduate education in geology and geophysics and conducts basic and applied research in geologic sciences. Offers B.S., M.S., and*

Ph.D. program options in general geology, economic geology, petroleum geology, geophysics, and ice-snow-permafrost geophysics.

School of Mineral Engineering
Duckering Bldg., Rm. 209
(907) 474-7366

Function: *Provides undergraduate and graduate education programs in geological engineering, mining engineering, mineral preparation engineering, and petroleum engineering. Through research programs conducts laboratory and field studies to promote mineral and energy development.*

Mineral Industry Research Laboratory (MIRL)
O'Neill Resources Bldg., Rm. 212B
(907) 474-7135
(907) 474-5400 (fax)

Function: *Conducts applied and basic research in exploration, development, and utilization of Alaska's mineral and coal resources with emphasis on coal characterization, coal utilization, coal upgrading, coal preparation, mineral beneficiation, fine gold recovery, hydrometallurgy, and environmental concerns. Publishes reports on research results and provides general information and assistance to the mineral industry.*

Mining Extension Program
Duckering Bldg., Rm. 401
(907) 474-7702

Function: *Offers prospecting and introductory mineral and mining courses under an open admissions policy.*

Mining and Petroleum Training Service
University of Alaska Anchorage
155 Smithway, Ste. 101
Soldotna, AK 99669
(907) 262-2788

Function: *Provides direct training and assistance to mine operators, service and support companies, and governmental agencies in mine safety and health, mining extension, vocational mine training, and technical transfer. Specialized training services in hazardous materals, first aid and CPR, industrial hygiene, and professional safety education and consulting are available on demand.*

University of Alaska Southeast
Institute of Mining Technology
P.O. Box 22434
Juneau, AK 99802-2434
(907) 463-4840
(907) 465-6864 (fax)

Function: *The IMT is designed to train students for entry-level positions in the mining industry. Students receive their training both in the classroom and at the IMT underground mine training site (the Maggie-Kathleen). Students will also receive their Mine Safety and Health Administration (MSHA) certification required by Federal Law. Training sessions last six weeks.*

FEDERAL AGENCIES

U.S. DEPARTMENT OF THE INTERIOR
Office of the Secretary
1689 C St., Ste. 100
Anchorage, AK 99501-5151
(907) 271-5485

Function: *Coordinates the Department of the Interior's policy and stewardship with DOI bureaus for the management of over 200 million acres of public land in Alaska.*

Bureau of Land Management
Alaska State Office and Anchorage Mineral Assessment Team
222 West 7th Ave., Ste. 13
Anchorage, AK 99513-7599
(907) 271-5477
Mineral Law Team - (907) 271-3833
Public Room - (907) 271-5960

Function: *Administers federal public lands (except national parks, wildlife refuges, national monuments, national forests, and military withdrawals). Issues leases for all federal leasable minerals including oil and gas, coal, phosphates, and oil shale. Arranges for sale of minerals other than leasable or salable materials, including sand, gravel, or stone. Issues right-of-way and special-use permits. Monitors mining operations to insure protection of surface resources. Maintains land-status plats and issues patents. Records federal mining claims and annual assessment affidavits.*

The Anchorage Mineral Assessment Team (formerly the Alaska staff of the Bureau of Mines) aids development of a viable mineral industry in Alaska with emphasis on field programs focused towards the identification of type, amount and distribution of mineral deposits in Alaska. The field information is augmented by other Bureau programs which provided information on beneficiation technologies (research); economic feasibility studies (potential supply); and economic and environmental effects of mineral development (policy analysis). Information is provided to other government agencies to aid land planning and land use decisions, and to the private sector to identify targets of opportunity for further exploration and/or development.

Anchorage District Office
6881 Abbott Loop Rd.
Anchorage, AK 99507-2599
(907) 267-1246
(907) 267-1267 (fax)

Glennallen District Office
P.O. Box 147
Glennallen, AK 99588
(907) 822-3217

Juneau Branch - Mineral Assessment Team
P.O. Box 20550
Juneau, AK 99802-0550
(907) 364-2111

Kotzebue Field Office
P.O. Box 1049
Kotzebue, AK 99752
(907) 442-3430
(907) 442-2720 (fax)

Nome Field Office
P.O. Box 925
Nome, AK 99762
(907) 443-2177

Northern District Office
1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2300

Tok Field Office
P.O. Box 309
Tok, AK 99780
(907) 883-5121

Fairbanks Support Center and Land Information Office (Public Room)
1150 University Ave.
Fairbanks, AK 99709-3844
(907) 474-2251

Function: *Primary contact for information on interior and northern regions.*

U.S. Fish and Wildlife Service
Region 7 Office
1011 East Tudor Rd.
Anchorage, AK 99503
(907) 786-3542

Function: *Administers the federal public lands in national wildlife refuges, issues special-use permits for activities on refuges, reviews permits and applications for various mining activities on all private and public lands and waters, and provides information to regulatory agencies on fish and wildlife and their habitat. Makes recommendations to regulatory agencies to mitigate adverse environmental impacts.*

Northern Alaska Ecological Services
101 12th Ave., Rm. 232
Box No. 19
Fairbanks, AK 99701
(907) 456-0327

U.S. Fish and Wildlife Service
Southeast Alaska Ecological Services
3000 Vintage Blvd., Ste. 201
Juneau, AK 99801-7100
(907) 586-7240
(907) 586- 7154 (fax)

Western Alaska Ecological Services
605 West 4th Ave., Rm. G-62
Anchorage, AK 99501
(907) 271-2888
(907) 271-2786 (fax)

U.S. Geological Survey
Geological Division
4200 University Dr.
Anchorage, AK 99508-4663
(907) 786-7403

Function: *Investigates and reports on physical resources; configuration and character of land surface; composition and structure of underlying rocks; and quality, volume, and distribution of water and minerals. Conducts 1:250,000-scale geologic mapping under the auspices of the Alaska Mineral Resource Assessment Program (AMRAP).*

Water Division
4230 University Dr., Ste. 201
Anchorage, AK 99508
(907)786-7100

U.S. Geological Survey Earth Science Information Center
National Mapping Division
4230 University Dr., Rm. 101
Anchorage, AK 99508-4664
(907) 786-7011

Function: *Publishes and distributes all available topographic maps of Alaska, digital products, and aerial photography.*

National Park Service
Alaska Regional Office
2525 Gambell St.
Anchorage, AK 99503
(907) 257-2626

Function: *Administers lands within the national park system in Alaska. Manages oil and gas operation and valid prior-right mining claims in parklands through plans of operation under Mining in Parks Act, National Park Service regulations, and other applicable federal and state laws and regulations.*

U.S. DEPARTMENT OF LABOR
Mine Safety and Health Administration
1000 Bucannon Blvd., Ste. 4
Boulder City, NV 89005

Juneau Field Station
Federal Building
P.O. Box 22049
Juneau, AK 99802-2049
(907) 586-7165

Function: *Administers health and safety standards to protect the health and safety of metal, nonmetal and coal miners. Cooperates with the State to develop health and safety programs and develops training programs to help prevent mine accidents and occupationally caused diseases. Under agreement with the Coal Mine Safety and Health Office, the MSHA metal/nonmetal section has assumed responsibility for enforcement and training activities at coal mines in Alaska.*

Mine Safety and Health Administration
Coal Mine Safety and Health, District 9
P.O. Box 25367
Denver, CO 80225
(303) 231-5458

Function: *Administers health and safety standards according to the Code of Federal Regulations to protect the health and safety of coal miners; requires that each operator of a coal mine comply with these standards. Cooperates with the State to develop health and safety programs and develops training programs to help prevent coal or other mine accidents and occupationally caused diseases in the industry.*

U.S. DEPARTMENT OF AGRICULTURE
Forest Service
Regional Office
Federal Bldg.
P.O. Box 21628
Juneau, AK 99802-1628
(907) 586-7869
(907) 586-7843 (fax)

Function: *Provides joint administration of general mining laws on national forest system lands with the Bureau of Land Management. Cooperates with Department of Interior agencies in the review and issuance of mineral leases. Issues permits for disposal of sand, gravel, and stone.*

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 10 Regional Office
1200 6th Ave., MS OW-130
Seattle, WA 98101
(206) 553-1746

Function: *Issues National Pollutant Discharge Elimination System (NPDES) permits under the Clean Water Act to regulate effluent discharges. Implements a compliance enforcement program. Maintains regulatory and review authority over wetland and NEPA/EIS-related issues.*

Alaska Operations Office
222 West 7th Ave., Ste. 19
Anchorage, AK 99513-7588
(907) 271-5083

Alaska Operations Office
410 Willoughby Ave., Ste. 100
Juneau, AK 99801
(907) 586-7619

U.S. DEPARTMENT OF THE ARMY
Corps of Engineers
Regulatory Branch
Attention: CENPA-CO-R
P.O. Box 898
Anchorage, AK 99506-0898
(907) 753-2712 or (800) 478-2712 (in Alaska only)

Function: *Regulates work in navigable waters of United States and discharge of dredged or fill material into United States waters, including wetlands. Examples of regulated mining activities include construction of berms, dikes, diversion pads, stockpiles, and reclamation activities.*

COOPERATIVE STATE-FEDERAL AGENCIES

Alaska Public Lands Information Center
250 Cushman St., Ste. 1A
Fairbanks, AK 99701
(907) 456-0527
(907) 456-0514 (fax)
(907)456-0532 (TDD for hearing impaired)

Function: *Clearinghouse for general information on outdoor recreation in Alaska. Information sources include U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Geological Survey, National Park Service, Alaska Departments of Natural Resources and Fish and Game, and Alaska Division of Tourism.*

BOARDS AND COMMISSIONS

Alaska Minerals Commission
P.O. Box 80148
Fairbanks, AK 99708
(907) 479-6240

Function: *The Mineral Commission was created by the Alaska State Legislature in 1986 to make recommendations to the Governor and the Legislature on ways to mitigate constraints on the development of minerals in Alaska. The Commission has published annual reports since 1987.*

Citizens' Advisory Commission on Federal Areas
3700 Airport Way
Fairbanks, AK 99709
(907)451-2775

Function: *The Citizens' Advisory Commission on Federal Areas was established in 1981 by the Alaska Legislature to protect the rights of Alaskans to continue their traditional uses of federal lands throughout the state. This was done in response to Congressional enactment in December 1980 of the Alaska National Interest Lands Conservation Act (ANILCA), which placed millions of acres of federally owned lands into conservation system units with restrictive land-use and management requirements.*

Alaska Science & Technology Foundation
4500 Diplomacy Dr., Ste. 515
Anchorage, AK 99508
(907) 272-4333

Function: *The Foundation was created to make public funds available for long-term investment in economic development and technological innovation within the State and to improve the health status of its residents. Through the awarding of grants for basic and applied research and development, the Foundation will enhance the State's economy and help build its science and engineering capabilities.*

CHAMBERS OF COMMERCE

Alaska State Chamber of Commerce
217 Second St., Ste. 201
Juneau, AK 99801
(907) 586-2323
(907) 463-5515 (fax)

Function: *The State Chamber of Commerce researches and formulates positions on Alaskan resource development. Recommendations for consideration are submitted to the State Chamber of Commerce board of directors.*

Juneau Chamber of Commerce
124 West 5th Ave.
Juneau, AK 99801
(907) 586-6420

Greater Fairbanks Chamber of Commerce
549 Ninth Ave., Ste. 100
Fairbanks, AK 99701
(907) 452-1105

Anchorage Chamber of Commerce
441 West 5th Ave., Ste. 300
Anchorage, AK 99501
(907) 272-2401

PUBLIC INTEREST GROUPS AND ASSOCIATIONS

Alaska Clean Water Alliance
P.O. Box 1441
Haines, AK 99827
(907) 766-2296
(907) 766-2290 (fax)

Alaska Miners Association, Inc.
Statewide Office
501 West Northern Lights Blvd., Ste. 203
Anchorage, AK 99503-2565
(907) 276-0347
(907) 278-7997 (fax)

Anchorage Branch
501 West Northern Lights Blvd., Ste. 203
Anchorage, AK 99503-2565
(907) 276-0347

Fairbanks Branch of AMA
P.O. Box 73069
Fairbanks, AK 99707
(907) 451-6650

Juneau Branch of AMA
P.O. Box 21684
Juneau, AK 99802-1684
(907) 586-4704
(907) 463-5712

Kenai Branch of AMA
P.O. Box 242
Sterling, AK 99672
(907) 262-6383

Nome Branch of AMA
P.O. Box 1974
Nome, AK 99762
(907) 443-2632

Alaska Women in Mining
Fairbanks Branch
P.O. Box 83542
Fairbanks, AK 99708
(907) 479-9750

Juneau Branch
P.O. Box 34044
Juneau, AK 99804
(907)586-4161

Anchorage Branch
P.O. Box 240334
Anchorage, AK 99524
(907) 276-6762

Alaskans for Juneau
P.O. Box 22428
Juneau, AK 99802-2428
(907) 463-5065

American Institute of Professional Geologists
7828 Vance Dr., Ste. 103
Arvada, CO 80003
(303) 431-0831
(303) 431-1332 (fax)
e-mail: aipg@ix.netcom.com

Alaska Section
P.O. Box 92082
Anchorage, AK 99509-2082
(907) 562-3279

National Wildlife Federation
750 W. Second Ave., Ste. 200
Anchorage, AK 99501
(907) 258-4800
(907) 258-4811 (fax)

Northern Alaska Environmental Center
218 Driveway St.
Fairbanks, AK 99701-2895
(907) 452-5021
(907) 452-3100
e-mail: nacc@polarnet.com

Northwest Mining Association
10 North Post St., Ste. 414
Spokane, WA 99201
(509) 624-1158
(509) 623-1241 (fax)
email: nwma@on-ramp.ior.com
Internet: http://www.nwma.org

Placer Miners of Alaska
P.O. Box 81110
Fairbanks, AK 99708
(907) 479-3100

Resource Development Council for Alaska, Inc.
121 W. Fireweed Ln., Ste. 250
Anchorage, AK 99503
(907) 276-0700
(907) 276-3887 (fax)

Sierra Club Legal Defense Fund
325 Fourth St.
Juneau, AK 99801
(907) 586-2751
(907) 463-5891 (fax)
e-mail: SCLDFAK@IGC.APC.ORG

Sierra Club Legal Defense Fund
11 East Main St., Ste. C
Bozeman, MT 59715
(406) 586-9699
(406) 586-9695 (fax)

Society for Mining, Metallurgy, and Exploration Inc.
P.O. Box 625002
Littleton, CO 80162-5002
(303) 973-9550
(303) 973-3845 (fax)

Secretary Treasurer-John Rishel
1505 Atkinson Dr.
Anchorage, AK 99504
(907) 337-0511

Southeast Alaska Conservation Council (SEACC)
419 6th St., Ste. 328
Juneau, AK 99801
(907) 586-6942
(907) 463-3312 (fax)

Trustees for Alaska
725 Christensen Dr., Ste. 4
Anchorage, AK 99501

ORGANIZED MINING DISTRICTS

Circle Mining District
P.O. Box 80674
Fairbanks, AK 99708
(907) 488-6058

Fairbanks Mining District
105 Dunbar
Fairbanks, AK 99701
(907) 456-7642

Forty-Mile Miners Association
P.O. Box 3885
Palmer, AK 99645
(907) 746-4404

Haines Mining District
P.O. Box 149
Haines, AK 99827
(907) 766-2228

Iditarod Mining District
John A. Miscovich
General Delivery
Flat, AK 99584

Juneau Mining District
P.O. Box 20765
Juneau, AK 99802
(907) 789-4065

Kantishna Mining District
P.O. Box 84608
Fairbanks, AK 99708

Koyukuk Mining District
P.O. Box 9066
Coldfoot, AK 99701

Livengood-Tolovana Mining District
P.O. Box 55698
North Pole, AK 99705
(907) 488-6453

Valdez Creek Mining District
P.O. Box 875534
Wasilla, AK 99687-5534

Yentna Mining District
13004 NE 9th Ave.
Vancouver, WA 98685

MINERAL EDUCATION PROGRAMS

ALASKA MINERAL AND ENERGY RESOURCE EDUCATION FUND (AMEREF)
c/o RDC
121 W. Fireweed Ln., Ste. 250
Anchorage, AK 99503
(907) 276-0070
(907) 276-3887 (fax)

Function: *A nonprofit corporation formed to help prepare students in grades K-12 to make informed decisions about Alaska's mineral and energy resources.*

Alaska Department of Education
801 W. 10th St., Ste. 200
Juneau, AK 99801-1894
(907) 465-8719

NATIVE REGIONAL CORPORATIONS

AHTNA INCORPORATED
Main Office
P.O. Box 649
Glennallen, AK 99588-0649
(907) 822-3476
(907) 822-3495 (fax)

Anchorage Office
406 Fireweed Ln., Ste. 204
Anchorage, AK 99503
(907) 274-7662
(907) 274-6614 (fax)

THE ALEUT CORPORATION
4000 Old Seward Hwy., Ste. 300
Anchorage, AK 99503-6087
(907) 561-4300
(907) 563-4328 (fax)

ARCTIC SLOPE REGIONAL CORPORATION
P.O. Box 129
Barrow, AK 99723-0129
(907) 852-8633
(907) 852-5733 (fax)

Anchorage Office
301 Arctic Slope Ave., Ste. 300
Anchorage, AK 99518-3035
(907) 349-2369
(907) 349-5476 (fax)

BERING STRAITS NATIVE CORPORATION
P.O. Box 1008
Nome, AK 99762-1008
(907) 443-5252
(907) 443-2985 (fax)

BRISTOL BAY NATIVE CORPORATION
800 Cordova St.
P.O. Box 100220 (mailing)
Anchorage, AK 99510-0220
(907) 278-3602
(907) 276-3924 (fax)

CALISTA CORPORATION
601 W. 5th Ave., Ste. 200
Anchorage, AK 99501-2225
(907) 279-5516
(907) 272-5060 (fax)

CHUGACH ALASKA CORPORATION
560 E. 34th Ave., Ste. 200
Anchorage, AK 99503-4196
(907) 563-8866
(907) 563-8402 (fax)

COOK INLET REGION INC. and its subsidary North Pacific Mining Corporation
P.O. Box 93330
Anchorage, AK 99509-3330
(907) 274-8638
(907) 263-5183 (fax)

DOYON LTD.
201 1st Ave., Ste. 300
Fairbanks, AK 99701
(907) 452-4755
(907) 456-6785 (fax)

KONIAG INCORPORATED
4300 B St., Ste. 407
Anchorage, AK 99503
(907) 561-2668
(907) 562-5258 (fax)

NANA REGIONAL CORPORATION
P.O. Box 49
Kotzebue, AK 99752
(907) 442-3301
(907) 442-2866 (fax)

Anchorage Office
1001 E. Benson Blvd.
Anchorage, AK 99508
(907) 265-4100
(907) 265-4123 (fax)

SEALASKA CORPORATION
One Sealaska Plaza, Ste. 400
Juneau, AK 99801
(907) 586-1512
(907) 586-2304 (fax)

APPENDIX D
Selected significant mineral deposits and mineral districts in Alaska[a]

The alphabetized list of mineral deposits and mineral districts is keyed to the list of explanatory paragraphs that follow. For example, The Lik deposit in the alphabetized list is "**Lik,** 1, (fig. D-1)." This says that the location of Lik is shown as number 1 in figure D-1.

Alaska-Juneau, 100, (fig. D-3).
Anderson Mountain, 54, (fig. D-1).
Apex-El Nido, 104, (fig. D-3).
Apollo-Sitka mines, 86, (fig. D-3).
Arctic, 9, (fig. D-1).
Avan Hills, 12, (fig. D-3).
Baultoff ,75, (fig. D-2).
Bear Mountain, 21, (fig. D-2).
Big Creek/Ladue, 58, (fig. D-1).
Big Hurrah, 32, (fig. D-3).
Binocular and other prospects, 72, (fig. D-1).
Bohemia Basin, 103, (fig. D-3).
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[a]This generalized summary does not describe all of the known 6,400 mineral deposits in Alaska.

NOTE: In cooperation with DGGS and the Russian Academy of Sciences, the USGS published Open-File Report 93-339 (Nokleberg and others, 1993), *Metallogenesis of mainland Alaska and the Russian northeast,* which describes 273 lode deposits and 43 significant placer districts in Alaska.

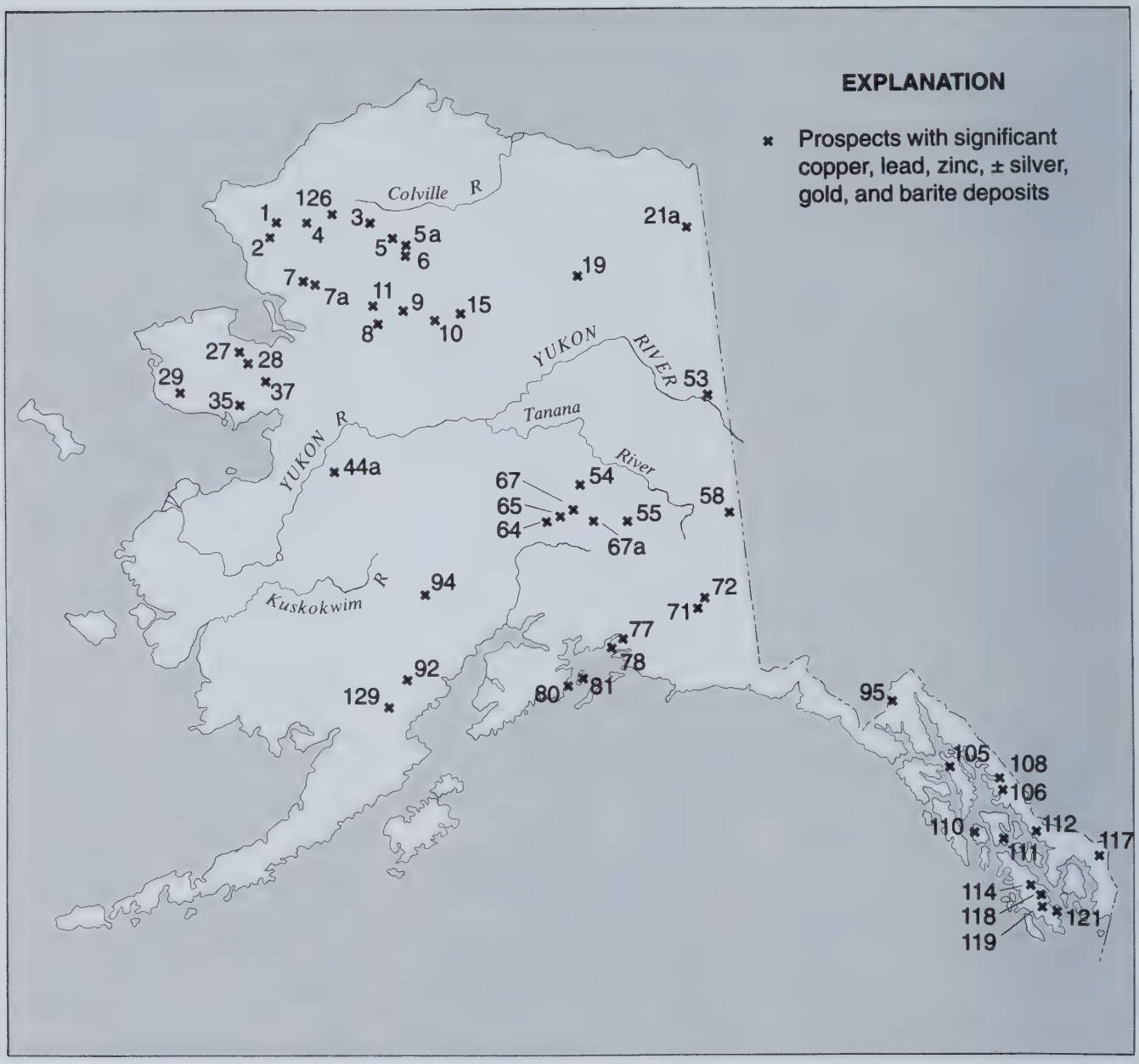


Figure D-1. *Significant copper, lead, zinc with credits of silver, gold, and barite deposits in Alaska, 1995.*

Map no.

1 **Lik** - Major strata-bound massive sulfide (Zn-Pb-Ag-Ba) deposit in black shale and chert. Proven reserve (Lik) estimate of 21.77 million tonnes (24 million tons) of 9% Zn, 3.1% Pb, and 48 g/tonne (1.4 oz/ton) Ag (fig. D-1).

2 **Red Dog** - At least three major strata-bound massive sulfide deposits hosted in Pennsylvanian or Mississippian shale; similar to locality 1. (a) The Main Deposit at Red Dog contains 52.2 million tonnes (57.5 million tons) of measured and indicated ore grading 19.5% Zn, 5.3% Pb, with 100 g/tonne (2.9 oz/ton) Ag. (b) The Aqqaluk Deposit contains 76 million tonnes (84 million tons) grading 13.7% Zn, 3.6% Pb, and 66 g/tonne (1.9 oz/ton) Ag. (c) The Hilltop Deposit with an inferred reserve is 14.1 million tonnes (15.55 million tons) grading 10.0% Zn, 2.7% Pb, and 41 g/tonne (1.2 oz/ton) Ag. (fig. D-1).

3 **Drenchwater** - Mississippian and Pennsylvanian shales and cherts contain three strata-bound base metal occurrences spatially related to acid volcanics. In the lowest unit, a siliceous mudstone, contains a 0.6 m (2-ft) layer with up to 23% Zn. An overlying gray chert contains up to 11% Zn and up to 5% Pb with some Ag in fracture fillings. At the top of the overlying tuffaceous layer, Ag-bearing Zn and Pb mineralization outcrops discontinuously for at least 1,982 m (6,500 ft), and contains up to 26% Zn and 51% Pb in grab samples (fig. D-1).

Figure D-2. *Significant molybdenum-copper and tin-tungsten with credits of fluorite and beryllium deposits in Alaska, 1995.*

4 **Ginny Creek** - Epigenetic, disseminated Zn-Pb-Ag deposits with barite in sandstone and shale of Noatak Sandstone of Late Devonian through Early Mississippian age. Random grab samples of surface float contain 0.3% to 3.0% Zn and highly variable amounts of Pb and Ag (fig. D-1).

5 **Story Creek** - Epigenetic replacement deposits of Zn-Pb-Ag-Cu-Au hosted in brecciated zones in Devonian Kanayut Conglomerate or Lower Mississippian Kayak Shale. Grab samples of high-grade material contain up to 0.43% Cu, 34% Pb, 28.8% Zn, 1.4 g/tonne (0.04 oz/ton) Au, and 1,028 g/tonne (30 oz/ton) Ag (fig. D-1).

5a **Kivliktort Mountain** - Mineralized float is widespread on the north flanks of the mountain, apparently spatially related to the contact between shales at the base of the hills and coarse-grained siliceous clastic rocks on the upper slopes. Rock samples containing up to 30% Zn have been reported (fig. D-1).

6 **Whoopee Creek** - Epigenetic replacement deposits of Zn-Pb-Cu-Ag-Au-Cd in breccia zones in Devonian Kanayut Conglomerate or Lower Mississippian Kayak Shale. Random grab samples of mineralized material contain 0.24% Cu, 0.37% Cd, 46% Zn, 44% Pb, 4.8 g/tonne (0.14 oz/ton) Au, and 507 g/tonne (14.8 oz/ton) Ag (fig. D-1).

7 **Omar** - Epigenetic replacement deposits of Paleozoic age; include bedded barite occurrences. Grab samples contain 15.3% Cu, 0.15% Pb, 0.95% Zn, 0.05% Co, and 10 g/tonne (0.3 oz/ton) Ag (fig. D-1).

7a **Frost** - Possible 8.2 million tonnes (9 million tons) barite in pods, lenses, and wavey-banded quartz-calcite-barite veins.

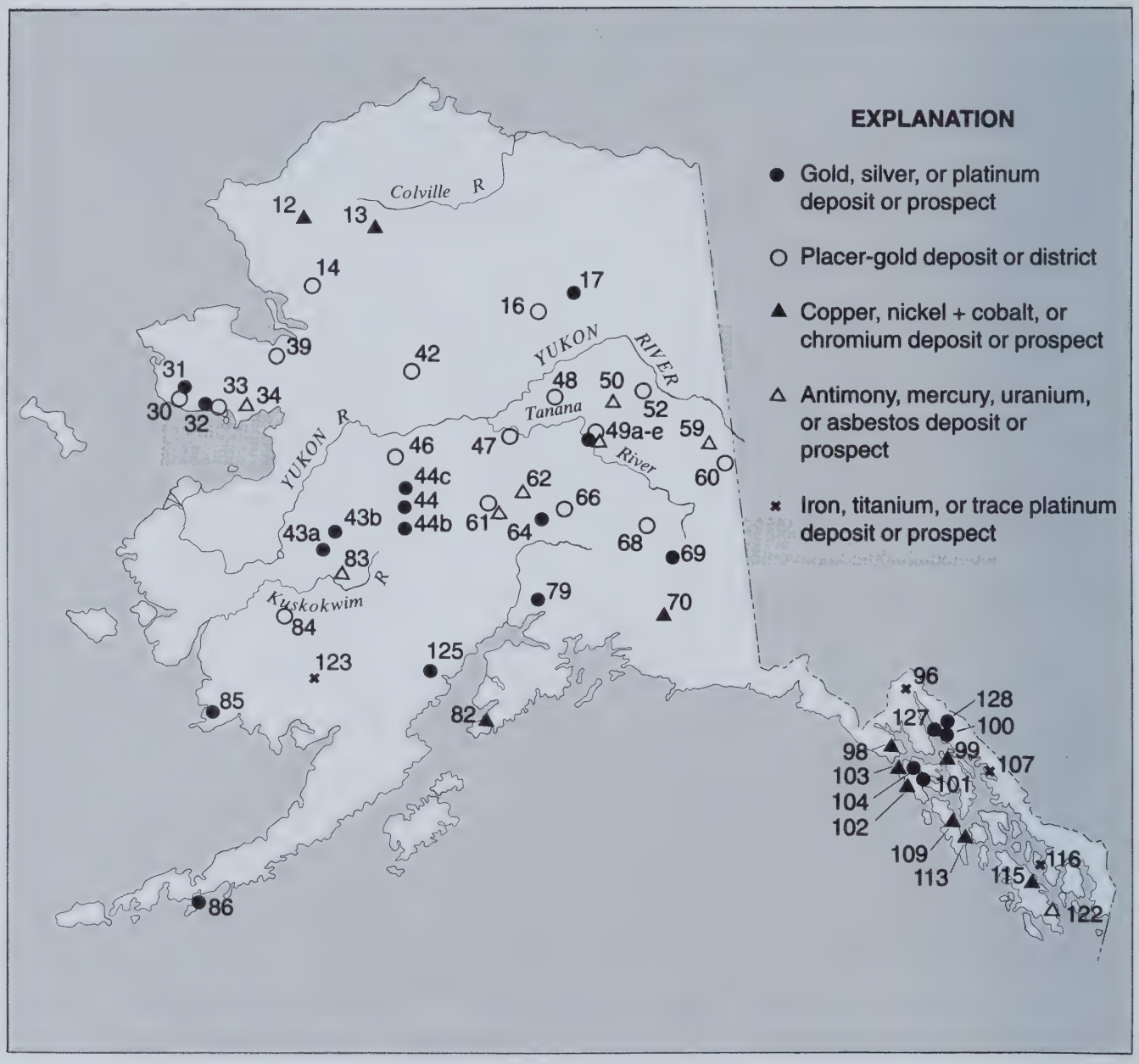


Figure D-3. *Significant gold, silver, platinum, and strategic mineral deposits in Alaska, 1995.*

Chalcopyrite and galena occur in the veins which cross cut Paleozoic limestone and dolomite for a minimum distance of 1.6 km (1 mi). Selected samples contain up to 13.2% Zn (fig. D-1).

8 **Bornite** - Major strata-bound Cu-Zn deposit in brecciated carbonate rock of Devonian age; 4.56 million tonnes (5.0 million ton) orebody contains 4.0% Cu and accessory Zn and Co. Larger reserve estimate of 36.2 million tonnes (40 million tons) of about 2% Cu and undisclosed amount of Zn and Co. At grade of 1.2% Cu, reserves are 91 million tonnes (100 million tons) (fig. D-1).

9 **Arctic** - Major volcanogenic (Cu-Zn) massive sulfide deposit hosted in sequence of metarhyolite, metatuff, and graphitic schist of Devonian age; indicated reserves of 36.3 million tonnes (40 million tons) grade 4.0% Cu, 5.5% Zn, 0.8% Pb, 55 g/tonne (1.6 oz/ton) Ag, and 0.69 g/tonne (0.02 oz/ton) Au (fig. D-1).

10 **Sun** - Major (Cu-Pb-Zn-Ag) massive sulfide deposit in sequence of middle Paleozoic metarhyolite and metabasalt. Average grades are 1 to 4% Pb, 6 to 12% Zn, 0.5 to 7% Cu, 103 to 377 g/tonne (3 to 11 oz/ton) Ag (fig. D-1).

11 **Smucker** - Middle Paleozoic volcanogenic massive sulfide deposit; 915 m (3,000 ft) long and up to 58 m (190 ft) wide contains significant tonnage of Cu-Pb-Zn ore that grades 1.5% Pb, 5 to 10% Zn, 103 to 343 g/tonne (3 to 10 oz/ton) Ag, with minor Au (fig. D-1).

12 **Avan Hills** - Disseminated chromite in layered ultramafic rocks; grab samples contain up to 4.3% Cr with 0.51 g/tonne (0.015 oz/ton) PGM (fig. D-3).

13 **Misheguk Mountain** - Chromite occurrences similar to those in Avan Hills (fig. D-3).

14 **Klery Creek** - Lode and placer Au deposits worked intermittently from 1909 through 1930s. Total production through 1931, mostly from placer deposits, estimated at 974 kg (31,320 oz) Au (fig. D-3).

15 **Ernie Lake** - (Ann Creek) Strata-bound massive sulfide occurrence in metarhyolite, metatuff, and marble. Gossan zones strongly anomalous in Cu-Pb-Zn and Ag (fig. D-1).

16 **Koyukuk-Nolan mining district** - Major placer Au district; from 1893 to 1995, produced an estimated 10,580 kg (340,152 oz) Au. Significant deep placer reserves remain (fig. D-3).

17 **Chandalar mining district** - Major Au producing district; substantial production in excess of 2,000 kg (64,367 oz) Au through 1995 from lode and placer sources; lode Au found in crosscutting quartz veins that intrude schist and greenstone. Active development of placer deposits and lodes in progress. Inferred lode reserves estimated to be 40,800 tonnes (45,000 tons) with grade of 69 g/tonne (2 oz/ton) Au (fig. D-3).

18 **Porcupine Lake** - Stratiform fluorite occurrences and argentiferous enargite, tetrahedrite associated with felsic volcanic rocks of late Paleozoic age. Reported grades of up to 25% to 30% fluorite (CaF_2) reported, with grab samples of 4.8% Cu (fig. D-2).

19 **Wind River** - Strata-bound Pb-Zn massive sulfide prospects; reported grades of up to 5% Pb (fig. D-1).

20 **Esotuk Glacier** - Disseminated Mo-Sn-W-Pb-Zn mineralization in skarns associated with Devonian(?) schistose quartz monzonite. Grab samples contain up to 0.08% Sn and 0.15% W (fig. D-2).

21 **Bear Mountain** - Major stockwork Mo-W-Sn occurrence in intrusive breccia. Rock samples containing up to 0.8% Mo and 0.6% W occur within a 14 ha (35 acre) area where soil samples average more than 0.2% MoS_2, and an adjacent 10 ha (25 acre) area where rubble contains wolframite has soils averaging greater than 0.12% WO_3. Rubble crop in this area indicates a Tertiary porphyry system as the source of the Mo and W (fig. D-2).

21a **Galena Creek** - Steeply dipping veins contain up to 21% Cu, 3.5% Zn, and 1.3% Pb with 189 g/tonne (5.5 oz/ton) Ag on the east side of the creek, and a large area of disseminated mineralization and veinlets contains predominantly Zn on the ridge west of the creek (fig. D-1).

22 **Cape Creek** - Major placer Sn producer. More than 454 tonnes (500 tons) Sn produced from 1935 to 1941; from 1979 to 1990, produced 940 tonnes (1,040 tons) Sn. Derived from Cape Mountain in contact zone of Cretaceous granite and limestone (fig. D-2).

23 **Buck Creek** - Major placer Sn producer. More than 998 tonnes (1,100 tons) Sn produced from 1902 to 1953 (fig. D-2).

24 **Lost River** - Major Sn, fluorite, W, and Be deposit associated with Cretaceous Sn granite system. More than 317 tonnes (350 tons) Sn produced from skarn and greisen lode sources. Measured reserves amount to 22.3 million tonnes (24.6 million tons) that grade 0.15% Sn, 16.3% CaF_2, and 0.03% WO_3, based on 13,720 m (45,000 ft) of diamond drilling (fig. D-2).

25 **Ear Mountain** - Placer Sn district and Sn-Cu-Au-Ag-Pb-Zn skarn mineralization of Cretaceous age. Area also anomalous in U (fig. D-2).

26 **Kougarok Mountain** - Sn deposit hosted in quartz-tourmaline-topaz greisen of Cretaceous age. Grades may average 0.5% Sn and 0.01% Ta and Nb, but a high grade resource of 136,050 tonnes (150,000 tons) grading 1% + Sn has been identified, with incrementally higher tonnage at lower grades (fig. D-2).

27 **Hannum** - Stratiform, carbonate-hosted Pb-Zn-Ag massive sulfide deposit of mid-Paleozoic age in heavily oxidized zone that ranges from 9 to 46 m (30 to 150 ft) thick. Mineralized zone reported to assay up to 10% Pb, 2.2% Zn, 1.4 g/tonne (0.04 oz/ton) Au, and 60.3 g/tonne (1.76 oz/ton) Ag (fig. D-1).

28 **Independence Creek** - Pb-Zn-Ag massive sulfide deposit; high-grade ore shipped in 1921 contained 30% Pb, 5% Zn, up to 5,141 g/tonne (150 oz/ton) Ag. Mineralization restricted to shear zone in carbonates (fig. D-1).

29 **Sinuk River region**- Several Pb-Zn-Ag-Ba-F bearing massive sulfide deposits and layered Fe deposits in carbonate and metavolcanic rocks of Nome Group. Mineralized zones extend for over 2,440 m (8,000 ft) along strike (fig. D-1).

30 **Nome mining district** - Major placer Au producer. Production from 1897-1995 in excess of 151,600 kg (4,874,449 oz) Au all from placers. Sporadic Sb and W production in past (fig. D-3).

31 **Rock Creek** - About 10.0 million tons grading 2.5 g/tonne (0.072 oz/ton) Au in vein swarms and stringers in an area 457 m (1,500 ft) long, 152 m (500 ft) maximum width and 91 m (300 ft) deep (fig. D-3).

32 **Big Hurrah** - Epigenetic vein deposit in black slate and metasedimentary rocks of the Soloman schist. Deposit contains some W mineralization and has produced over 840 kg (27,000 oz) Au from nearly 45,350 tonnes (50,000 tons) milled ore. Proven, inferred, and indicated reserves total 94,328 tonnes (104,000 tons) that grade 21 g/tonne (0.61 oz/ton) Au, 19 g/tonne (0.55 oz/ton) Ag, and credits of WO_3 (fig. D-3).

33 **Solomon and Council mining districts** - Major placer Au districts; produced over 32,550 kg (1,046,513 oz) through 1995. Three structurally controlled Au deposits in Bluff area—Daniels Creek, Saddle, and Koyana Creek—contain minimum inferred reserves of 5.9 million tonnes (6.5 million tons) grading 3.4 g/tonne (0.1 oz/ton) Au (fig. D-3).

34 **Kachauik** - U prospect in Cretaceous alkalic intrusive rocks. Highly anomalous geochemical values and U concentrations of 1,000 ppm reported (fig. D-3).

35 **Omalik** - Vein-type Pb-Zn-Ag massive sulfide prospect in Paleozoic carbonate rocks; from 1881 to 1900, produced 363 tonnes (400 tons) of Pb-Zn ore that averaged about 10% Pb and 1,371 g/tonne (40 oz/ton) Ag. Grades of oxidized Zn ore reported to be up to 34% Zn (fig. D-1).

36 **Windy Creek** - Disseminated Mo-Pb-Zn mineralization in quartz veins and skarns with reported values as high as 0.15% Mo (fig. D-2).

37 **Quartz Creek** - Significant Pb-Zn-Ag mineralization; reported grades of 15% combined Pb-Zn and 343 g/tonne (10 oz/ton) Ag (fig. D-1).

38 **Placer River** - Significant Mo-F mineralization disseminated in intrusive rocks. Reported values of 0.2% Mo (fig. D-2).

39 **Fairhaven/Inmachuk district** - Placer deposits with 10,812 kg (347,671 oz) production from 1902-1995; significant reserves remaining in a large ancestral channel system. Large base metal sulfide concentrations and U values in concentrates (fig. D-3).

40 **Poovookpuk Mountain** - Porphyry Mo mineralization. Reported grades of up to 0.25% Mo (fig. D-2).

41 **Purcell Mountain** - Mo and Ag occurrences associated with Cretaceous alkalic igneous plutons, alaskite, and bostonite dikes (fig. D-2).

42 **Koyukuk-Hughes mining district** - Production of 7,211 kg (231,888 oz) Au from 1930 to 1995, mainly from Alaska Gold Company dredge at Hogatza; dredge reactivated in 1981, but deactivated in 1984, and reactivated again in 1990. Nonfloat mechanized operation on Utopia Creek produced significant amount of placer Au from 1930 to 1962 (fig. D-3).

43a **Iditarod district** - Major placer Au district; produced 48,560 kg (1,561,524 oz) Au through 1995. Significant reserves of lode-Au and lode-W at Golden Horn deposit Chicken Mountain, and other known lodes in region associated with shear zones and monzonite intrusive rocks of Late Cretaceous age (fig. D-3).

43b **Innoko-Tolstoi mining district** - Major placer Au district with significant lode Au-Sb-Hg potential; lode sources for placers are volcanic-plutonic complexes of Late Cretaceous and dike swarms that intrude Mesozoic flysch; mining district produced 21,965 kg (706,267 oz) Au through 1995 almost all from placer deposits. New discovery on Vinasale Mountain south of McGrath is Au-polymetallic deposit in monzonite stock (fig. D-3).

44 **Nixon Fork** - Promising Au-Cu deposits; Nixon Fork mine produced 1,851 kg (59,500 oz) Au from Late Cretaceous skarns associated with quartz monzonite-Devonian limestone contact zones. Underground mining resumed in October, 1995 (fig. D-3).

44a **Illinois Creek** - Near-surface geologic resource is 5.76 million tonnes (6.35 million tons) at 2.4 g/tonne (0.070 oz/ton) gold and 51.47 g/tonne (1.5 oz/ton) silver (fig. D-1).

44b **Vinasale Mountain** - Intrusive hosted gold deposit. Au mineralization is associated with arsenopyrite and pyrite and within zones of phyllic and silicic alteration hosted within a 69 Ma quartz monzonite stock. Both disseminated an veinlet mineralization exist. An inferred reserve of 10.3 million tonnes (11.35 million tons) grading 2.4 g/tonne (0.07 oz/ton) has been identified by drilling (fig. D-3).

44c **Von Frank Mountain** - Gold and very weak copper mineralization are associated with chalcopyrite, pyrite, and rare molybdenite within a zone of quartz stockwork veining hosted in a 69 Ma quartz-diorite stock. The stock is a cupola of the larger Von Frank Pluton. Drill intercepts include thicknesses up to 429 feet with an average grade of 0.013 opt Au. Higher grade intercepts include 0.035 opt Au up to 135 ft. (fig. D-3).

45 **Bonanza Creek** - Skarn-type W mineralization along intrusive contact; no published information available (fig. D-2).

46 **Ruby mining district** - Placer Au-Sn district; produced more than 14,830 kg (476,751 oz) Au from 1931 to 1995; mining district also contains Pb-Ag prospects with grades reportedly as high as 2,811 g/tonne (82 oz/ton) Ag (fig. D-3).

47 **Hot Springs mining district** - Placer Au-Sn district; produced more than 17,685 kg (568,632 oz) Au and over 326,590 kg (720,000 lb) cassiterite through 1995. Includes Eureka and Tofty subdistricts (fig. D-3).

48 **Livengood-Tolovana mining district** - Placer Au district; produced more than 15,440 kg (496,417 oz) Au since discovery in 1914 to 1995. Substantial reserves remain mainly on Livengood Bench, a Pliocene ancestral channel (fig. D-3).

49 **Fairbanks mining district** - Nationally ranked Au-producing district; largest producer in Alaska. Produced about 249,500 kg (8,022,434 oz) Au from placer deposits (1902-1995). Major lode-Au and lode-Sb producer; produced more than 9,472 kg (304,548 oz) Au and over 1.8 million kg (4 million lb) Sb from veins and shear zones through 1990. Production of W exceeded 4,000 STU since 1915, all derived from skarn near Cretaceous quartz monzonite (fig. D-3).

49a **Fort Knox** - Disseminated Au deposit within granodiorite/quartz monzonite pluton near Fairbanks. Proven and probable reserves, open at depth, are 128,000 kg (4,117,000 oz) of gold in 158.3 million tonnes (174.5 million tons) of rock (fig. D-3).

49b **Ryan Lode** - Based on a 0.51 g/tonne (0.015 oz/ton) cutoff, total reserves in the metasediment-hosted Ryan Lode and subparallel igneous-hosted Curlew Shear are 25,573 kg (822,200 oz) of gold in 13.2 million tonnes (14.6 million tons) of rock. A geologic resource of about 74,468 kg (2.4 million oz) occurs within the total shear zone system (fig. D-3).

49c **Grant Mine** - A series of subparallel Au-bearing quartz veins in the schist and quartzite of Ester Dome based on exploration in 1990. Indicated reserves on one vein system, the O'Dea, are 192,285 tonnes (212,000 tons) of 12 g/tonne (0.36 oz/ton) Au. Other similar vein systems have been identified within the property (fig. D-3).

49d **True North** - Au occurs in siderite-quartz veins in carbonaceous quartzite and schist within a terrane containing eclogitic rocks. The proven and probable mineable reserve is 6.24 million tonnes (6.87 million tons) grading 2.23 g/tonne Ag (0.065 oz/ton) for a contained 13,872 kg (446,000 oz) Au. Further exploration is expected to increase the reserve base (fig. D-3).

49e **Dolphin** - Recently recognized mineralized intermediate intrusion contains anomalous gold, arsenic, bismuth, and antimony. Discovery hole in 1995 intercepted 100 m of 1.68 g/tonne (330 ft of 0.049 oz/ton) gold (fig. D-3).

50 **Mt. Prindle** - Significant U-rare-earth mineralization in Mesozoic alkaline igneous rocks. Rock geochemical values of up to 0.7% U; up to 15% rare-earth elements reported (fig. D-3).

51 **Twin Mountain** - Significant W mineralization associated with skarn development along contact zone of quartz monzonite stock of Cretaceous age (fig. D-2).

52 **Circle mining district** - Currently one of Alaska's largest producing placer-Au district; produced 31,960 kg (1,027,607 oz) Au since discovery in 1893 to 1995. Has significant potential for Sn, W, and Au mineralization from variety of lode sources (fig. D-3).

53 **Three Castle Mountain, Pleasant Creek, Casca VABM** - Strata-bound Pb-Zn massive sulfide mineralization. Reported grades of up to 17% Zn and 2% Pb (fig. D-1).

54 **Bonnifield district massive sulfide deposits (Anderson Mountain, Dry Creek, Sheep Creek, Virginia Creek, BT, Liberty Belle)** - Significant volcanogenic Cu-Pb-Zn-Ag massive sulfide deposits of Devonian to Mississippian age in Bonnifield mining district. Potential for high-grade deposits reported. Includes Liberty Bell strata-bound Au-B deposit and mineralization in Sheep Creek; latter contains Sn as well as base metals (fig. D-1).

55 **Delta massive sulfide belt** - Contains at least 30 known volcanogenic massive sulfide deposits and occurrences. Grades from 0.3% to 1.1% Cu, 1.7% to 5.7% Zn, 0.5% to 2.3% Pb, 24 to 69 g/tonne (0.7 to 2.0 oz/ton) Ag, and 0.61 to 2.1 g/tonne (0.018 to 0.061 oz/ton) Au; estimated potential reserve of 34.6 million tonnes (40 million tons) for all deposits (fig. D-1).

56 **Mosquito, Peternie** - Porphyry Mo prospects of early Tertiary age; reported grades of up to 0.17% Mo (fig. D-2).

57 **Taurus** - Significant major porphyry Cu-Au prospect of Paleocene age. East Taurus Zone contains inferred reserves of 126 million tonnes (140 million tons) grading about 0.30% Cu and 0.34 g/tonne (0.01 oz/ton) Au, and 0.03% Mo (fig. D-2).

58 **Big Creek/Ladue** - Strata-bound Pb-Zn-Ag massive sulfide prospects in metavolcanic rocks (fig. D-1).

59 **Slate Creek** - At least 50 million tonnes (55 million tons) of 6.3%, high-quality chrysotile asbestos in serpentinized ultramafic rocks of Permian(?) age (fig. D-3).

60 **Fortymile mining district** - Major placer Au district. Produced over 16,640 kg (534,974 oz) placer and very minor lode Au since discovery in 1883 to 1995, the longest continuous production of gold (113 years) of any Alaskan mining district (fig. D-3).

61 **Kantishna mining district** - Major placer Au and lode Ag-Au-Pb-Zn-Sb-W district. Produced 3,089 kg (99,307 oz) placer and lode-Au, about 9,549 kg (307,000 oz) lode Ag, and 2.3 million kg (5million lb) Sb from shear zones and vein deposits hosted in metamorphic units of Yukon-Tanana terrane. Nearly 90 lode deposits have been identified; potential exists for significant Ag-Au-Pb-Zn resources. Metalliferous strata-bound base metal deposits occur in schist and quartzite (fig. D-3).

62 **Stampede mine** - Major Sb deposit; produced more than 1.42 million kg (3.5 million lb) Sb from large shear zone in polymetamorphic rocks of Yukon-Tanana terrane (fig. D-3).

63 **Coal Creek** - Greisen-hosted Sn-Cu-W deposit in "McKinley" age pluton (55 million-year-old). Reported reserves of 4.54 million tonnes (5 million tons) of ore that grade 0.28% Sn and 0.3% Cu with credits of W, Ag, and Zn (fig. D-2).

64 **Golden Zone mine** - Major Au-Cu-Ag deposits in Late Cretaceous breccia pipe and skarn deposits. Produced more than 49 kg (1,581 oz) Au, 268 kg (8,617 oz) Ag, and 19,051 kg (42,000 lb) Cu. On the basis of recent (1994) drilling, the Pipe, Bunkhouse, and Copper King deposits contain 12.1 million tonnes (13.3 million tons) grading 3.25 g/tonne (0.095 oz/ton) gold (figs. D-1 and D-3).

65 **Nim Prospect** - Porphyry Cu-Ag-Au deposit of Late Cretaceous age. Reported grades of up to 5.0% Cu and 309 g/tonne (9 oz/ton) Ag (fig. D-1).

66 **Valdez Creek district** - About 15,813 kg (508,454 oz) Au production through 1995. Cambior Alaska Inc., the largest placer mine in Alaska, operated in this district until September, 1995 (fig. D-3).

67 **Denali Prospect** - At least six small, strata-bound Cu lodes in volcanic sedimentary rocks of Triassic age that may contain 4.54 million tonnes (5 million tons) ore that grade about 2% Cu with credits of Ag (fig. D-1).

67a **Zackly** - Disseminated copper and gold in a garnet-pyroxene skarn and marble. Reserves are estimated as 1.27 million tonnes (1.4 million tons) grading 2.6 percent Cu and 6.0 g/ton (0.175 oz/ton) Au (fig. D-1).

68 **Chistochina** - Porphyry Cu prospects of Tertiary age and placer-Au district; produced more than 5,637 kg (181,261 oz) Au and small amount Pt from placer deposits (fig. D-3).

69 **Nabesna mine** - Classic high-grade Au skarn that envelopes quartz diorite of Jurassic(?) age; produced over 2,068 kg (66,500 oz) Au from about 79,816 tonnes (88,000 tons) of ore from 1930 to 1941 (fig. D-3).

70 **Spirit Mountain** - Massive and disseminated Cu-Ni mineralization in mafic-ultramafic complex (fig. D-3).

71 **Kennecott deposits** - Major stratiform Cu-Ag massive sulfide deposits localized near contact between Chitistone Limestone and Nikolai Greenstone of Triassic age; contained some of highest grade Cu lodes mined in North America. From 1911 to 1938, produced more than 544 million kg (1.2 billion lb) Cu and 311,028 kg (10 million oz) Ag from 4.35 million tonnes (4.8 million tons) ore. Some reserves remain (fig. D-1).

72 **Binocular and other prospects** - Kennecott-type Cu-Ag massive sulfide deposits (fig. D-1).

73 **Bond Creek - Orange Hill** - Two major porphyry Cu-Mo deposits of Late Cretaceous age; reported inferred reserves of 770 million tonnes (850 million tons) ore that grade 0.3 to 0.5% Cu and 0.03% Mo (fig. D-2).

74 **Carl Creek** - Porphyry Cu prospect in altered intrusive complex; similar to locality 73 (fig. D-2).

75 **Baultoff** - Porphyry Cu prospect in altered intrusive rocks; inferred reserves of 132 million tonnes (145 million tons) of 0.20% Cu similar to locality 73 (fig. D-2).

76 **Horsfeld** - Porphyry Cu prospect; similar to locality 73 (fig. D-2).

77 **Midas mine** - Significant strata-bound Cu (Ag-Au-Pb-Zn) massive sulfide deposit in volcanic sedimentary rocks of Tertiary Orca Group. Produced more than 1.5 million kg (3.3 million lb) Cu from 44,760 tonnes (49,350 tons) ore (fig. D-1).

78 **Ellamar** - Strata-bound Cu-Zn-Au massive sulfide deposit in sediment of Eocene(?) Orca Group. Produced more than 7.3million kg (16 million lb) Cu, 1,596 kg (51,307 oz) Au, and 5,960 kg (191,615 oz) Ag from about 273,764 tonnes (301,835 tons) ore (fig. D-1).

79 **Willow Creek, Independence, Lucky Shot, War Baby** - Major lode-Au (Ag-Cu-Pb-Zn-Mo) in veins that cut Mesozoic

quartz diorite. Produced more than 18,860 kg (606,400 oz) Au from lode sources and about 1,729 kg (55,600 oz) Au from associated placer deposits (fig. D-3).

80 **Latouche, Beatson** - Major strata-bound Cu-Zn-Ag massive sulfide deposits in Orca Group sedimentary rocks and mafic volcanic rocks. Produced more than 93 million kg (205 million lb) Cu from 5.4 million tonnes (6 million tons) ore. Inferred reserves of 4.53 million tonnes (5 million tons) ore that grade 1% Cu, 1.5% Pb+Zn (fig. D-1).

81 **Rua Cove** - Major strata-bound Cu-Zn massive sulfide deposit in complex ore shoots enclosed in mafic volcanic rocks of Orca Group. Reported reserves of over 1 million tonnes (1.1 million tons) ore that grade 1.25% Cu (fig. D-1).

82 **Red Mountain and Claim Point** - Significant Cr occurrence associated with layered ultramafic complexes of Tertiary age at Red Mountain near Seldovia. More than 35,419 tonnes (39,951 tons) metallurgical-grade ore shipped through 1976; huge low-grade Cr resource may remain, of which 27 million tonnes (30 million tons) grade 5.1% Cr_2O_3 (fig. D-3).

83 **Red Devil** - Major Hg-Sb deposit; high-grade epithermal Hg-Sb deposit hosted in shear zones in Kuskokwim Group sedimentary rocks. More than 1.24 million kg (35,000 flasks) Hg produced from 68,025 tonnes (75,000 tons) ore (fig. D-3).

84 **Donlin Creek-Aniak district** - Significant placer Au district. Aniak mining district produced 17,680 kg (568,601 oz) Au from placer deposits, mainly from the Nyac and Donlin Creek areas. Gold-polymetallic deposits hosted in granite porphyry dikes and sills of Donlin Creek area recently estimated to contain 40.4 million tonnes (44.5 million tons) grading 2.75 g/tonne (0.08 oz/tonne) gold (fig. D-3).

85 **Goodnews Bay** - Major placer Pt district; estimated to have produced over 17,261 kg (555,000 oz) refined PGE metals from 1934 to 1976; one of the largest known PGE metal resources in United States. Possible resources of 45 million m^3 (60 million yd^3) of deep, PGE-bearing gravels remain. Lode source believed to be Alaskan-type zoned ultramafic complex of Jurasssic or Cretaceous age. Possible significant offshore placer potential (fig. D-3).

86 **Apollo-Sitka mines** - Major lode Au deposits; produced more than 3,347 kg (107,600 oz) Au from ore that averaged about 7.5 g/tonne (0.22 oz/ton) Au. Inferred reserves are 678,440 tonnes (748,000 tons) grading 26 g/tonne (0.76 oz/ton) Au, 74 g/tonne (2.16 oz/ton) Ag, with base metal credits (fig. D-3).

87 **Pyramid** - Late Tertiary porphyry Cu-Mo deposit; inferred reserves of 113 million tonnes (125 million tons) ore that grade 0.4% Cu and 0.03% Mo reported (fig. D-2).

88 **Ivanof** - Late Tertiary porphyry Cu prospect; grades of up to 0.72% Cu reported. Potential for large tonnages (fig. D-2).

89 **Weasel Mountain, Bee Creek** - Porphyry Cu-Mo prospect of late Tertiary to Quaternary age; grades of up to 0.48% Cu and 0.035% Mo reported. Potential for moderate tonnages of low-grade mineralization (fig. D-2).

90 **Mike deposit** - Porphyry Mo prospect of late Tertiary age; grades of up to 0.21% Mo reported. Potential for large tonnages of low-grade Mo mineralization (fig. D-2).

91 **Rex deposit** - Porphyry Cu prospect similar to locality 90; grades of up to 0.3% Cu reported. Potential for moderate reserves of low-grade mineralization (fig. D-2).

92 **Kasna Creek** - Major stratiform Cu-Pb-Zn and skarn-sulfide deposits of Mesozoic age in mafic, volcanic, and sedimentary rocks; reported reserves of over 9,070,000 tonnes (10 million tons) ore that grade more than 1% Cu (fig. D-1).

93 **Sleitat Mountain** - High-grade east-west-trending, Sn-W-Ag topaz-quartz greisen system hosted in 59 million-year-old old binary granite and in hornfels. Zone up to 1,915 m (3,000 ft) long and 152 m (500 ft) wide. One drill-hole showed 26 m (85 ft) of 1.8% Sn, and 0.4% W. Inferred resources are 58 to 96 million kg (128 to 212 million lb) Sn in 26.3 million tonnes (29 million tons) ore (fig. D-2).

94 **Jimmy Lake** - Complex Cu-Ag-Sn mineralization of late Tertiary(?) age; reported grades of up to 3,599 g/tonne (105 oz/ton) Ag and 3% Cu (fig. D-1).

95 **Haines Barite** - Major stratiform Ba-Pb-Zn-Cu-Ag deposit in pillow basalt-dominated section of Paleozoic or Triassic age; consists of 15- to 18-m (48- to 60-ft)-thick zone of 60% barite with upper zone [0.6 to 2.4 m (2 to 8 ft) thick] of massive sulfides that contain 2% Pb, 3% Zn, 1% Cu, up to 137 g/tonne (4 oz/ton) Ag, and 4 g/tonne (0.12 oz/ton) Au. Estimated to contain 680,250 tonnes (750,000 tons) of 65% barite with Zn and Ag credits (fig. D-1).

96 **Klukwan** - Major Fe-Ti deposits in zoned ultramafic complex of Mesozoic age; reported to contain 2.7 billion tonnes (3 billion tons) of material that contains 16.8% Fe and 1.6 to 3.0% Ti (fig. D-3).

97 **Nunatak** - Porphyry Mo deposit; reported reserves of 7.7 million tonnes (8.5 million tons) ore that grades 0.125% Mo and 117 millions tonnes (129 million tons) of 0.04% Mo (fig. D-2).

98 **Brady Glacier** - Major Ni-Cu deposit in layered gabbro-pyroxenite complex of Tertiary age. Proven reserves of 91 million tonnes (100 million tons) ore that grade 0.5% Ni, 0.3% Cu reported and about 0.03% Co; also contains PGE concentrations (fig. D-3).

99 **Mertie Lode and Funter Bay mining district** - Contains substantial reserves of lode Au mineralization. Past production totaled about 466 kg (15,000 oz) Au. Deposits also contain significant Ni-Cu and Pb-Zn-Ag mineralization. Funter Bay deposit contains reported reserves of 507,920 tonnes (560,000 tons) that grade 0.34% Ni, 0.35% Cu, and 0.15% Co in gabbro-pipe system (fig. D-3).

100 **Alaska-Juneau** - Major lode Au deposit that consists of 30 to 90 m (100- to 300-ft) wide zone that contains en echelon, Au-bearing quartz veins in metamorphic rocks; produced more than 109,482 kg (3.52 million oz) Au from 80 million tonnes (88.5 million tons) ore from 1893 to 1944. Reserves (all categories), of 96 million tonnes (105.7 million tons) of 1.7 g/tonne (0.05 oz/ton) Au remain (fig. D-3).

101 **Chichagof and Hirst Chichagof** - Major lode-Au deposits in quartz veins that cut Mesozoic graywacke; produced more than 23,949 kg (770,000 oz) Au, most of which was produced at Chichagof mine. Inferred leased reserves estimated to be 3,110 kg (100,000 oz) Au (fig. D-3).

102 **Mirror Harbor** - Ni-Cu mineralization in layered-gabbro complex of Mesozoic age; reported proven reserves of 7,256 tonnes

(8,000 tons) of 1.57% Ni and 0.88% Cu and reported inferred reserves of several million tons ore that grade 0.2% Ni and 0.1% Cu (fig. D-3).

103 **Bohemia Basin** - Major Ni-Cu-Co mineralization in layered mafic complex similar to locality 102; reported reserves of 20 million tonnes (22 million tons) ore that grade 0.33 to 0.51% Ni, 0.21 to 0.27% Cu, and 0.02% Co, all of which are recoverable with standard flotation technology (fig. D-3).

104 **Apex-El Nido** - Significant lode Au-W deposits that occur as crosscutting veins in graywacke; produced more than 1,555 kg (50,000 oz) Au (fig. D-3).

105 **Greens Creek** - Major sediment-hosted Pb-Zn-Cu-Ag-Au volcanogenic massive sulfide deposit of Devonian or Triassic age; most recent reserve estimate of the original oredbody is 10 million tonnes (11.0 million tons) grading 4.1 g/tonne (0.12 oz/ton) Au, 456 g/tonne (13.3 oz/ton) Ag, 12.8% Zn, and 4.0% Pb. Additional reserves in the southwest orebody are 1.81 million tonnes (2.0 million tons) grading 13.5% Zn, 5.5% Pb, 9.25 g/tonne (0.27 oz/ton) Au, and 1,131 g/tonne (33 oz/ton) Ag. Total combined reserves and resources of the mine are estimated to be 16.34 million tonnes (18 million tons) (fig. D-1).

106 **Sumdum** - Volcanogenic Cu-Pb-Zn massive sulfide deposit in Mesozoic metamorphic complex with potential strike length of over 3,048 m (10,000 ft). Inferred reserves of 24 million tonnes (26.7 million tons) ore that grade 0.57% Cu, 0.37% Zn, and 10 g/tonne (0.3 oz/ton) Ag reported (fig. D-1).

107 **Snettisham** - Fe-Ti deposit in mafic zoned-intrusive complex; reported grades of about 18.9% Fe and 2.6% Ti (fig. D-3).

108 **Tracy Arm** - Strata-bound Cu-Zn-Pb massive sulfide prospect in Mesozoic schist; over 335 m (1,100 ft) long and up to 3.7 m (12 ft) thick. Reported grades of 1.5% Cu, 3.9% Zn, 26 g/tonne (0.76 oz/ton) Ag, and 0.44 g/tonne (0.013 oz/ton) Au (fig. D-1).

109 **Red Bluff Bay** - Significant chrome mineralization in Mesozoic ultramafic complex (probably ophiolite); reported reserves of 517 tonnes (570 tons) of material that grade 40% Cr and 26,303 tonnes (29,000 tons) that grade 18 to 35% Cr (fig. D-3).

110 **Cornwallis Peninsula** - Volcanogenic Cu-Pb-Zn-Ag-Ba massive sulfide deposit of Triassic(?) age; reported grades of up to 20% Pb-Zn and 788 g/tonne (23 oz/ton) Ag 9 (fig. D-1).

111 **Castle Island** - Stratiform barite deposit of Triassic age hosted in carbonate and pillow basalt; about 776,390 tonnes (856,000 tons) of raw and refined barite produced from 1963 to 1980; also contains Zn, Pb, and Cu sulfides. Reported to be mined out (fig. D-1).

112 **Groundhog Basin** - Area contains several massive sulfide prospects in Mesozoic schist and gneiss whose origins are now thought to be plutonic associated. Reported grades of up to 8% Pb, 994 g/tonne (29 oz/ton) Ag, and 17 g/tonne (0.5 oz/ton) Au. Sn has also been recently identified. Area also contains potential for porphyry Mo deposits (fig. D-1).

113 **Snipe Bay** - Ni-Cu deposit in zoned mafic-ultramafic complex; inferred reserves of 390,000 tonnes (430,000 tons) of 0.3% Ni, 0.3% Cu, and 4.4 g/tonne (0.13 oz/ton) Ag reported (fig. D-3).

114 **Kasaan Peninsula** - Major skarn-type Cu-Fe-Au massive sulfide deposit of Jurassic age; area has produced over 12.7 million kg (28 million lb) Cu, and 1,711 kg (55,000 oz) Ag. Reported reserves of 3.6 million tonnes (4 million tons) ore that grade 50% Fe and less than 2% Cu (fig. D-1).

115 **Salt Chuck** - Cu-PGM-Ag-Au deposit in contact zone between pyroxenite and gabbro within Alaskan-type zoned mafic-ultramafic pluton. From 1900 to 1941, 2.3 million kg (5 million lb) Cu, over 622 kg (20,000 oz) PGM, and Au and Ag credits were produced from 294,775 tonnes (325,000 tons) ore (fig. D-3).

116 **Union Bay** - Significant Fe-Ti mineralization in ultramafic complex; area also contains Pt and V concentrations (fig. D-3).

117 **Hyder mining district** - Area produced more than 22,675 tonnes (25,000 tons) high-grade W-Cu-Pb-Zn-Ag ore from 1925 to 1951 from crosscutting ore shoots in Texas Creek granodiorite of Tertiary age. Area also contains potential for porphyry Mo-W mineralization and massive sulfide-skarn Pb-Ag-Au-W deposits (figs. D-1 and D-2).

118 **Jumbo** - Cu-Fe-Mo-Ag skarn deposit; produced more than 4.5 million kg (10 million lb) Cu, 8,708 kg (280,000 oz) Ag, and 218 kg (7,000 oz) Au from 113,375 tonnes (125,000 tons) ore. Zoned magnetite-Cu skarns are associated with epizonal granodiorite pluton of Cretaceous age. Reported reserves of 589,550 tonnes (650,000 tons) ore that grade 45.2% Fe, 0.75% Cu, 0.3 g/tonne (0.01 oz/ton) Au, and 2.74 g/tonne (0.08 oz/ton) Ag (fig. D-1).

119 **Copper City** - Stratiform Cu-Zn-Ag-Au massive sulfide deposit hosted in late Precambrian or earliest Paleozoic Wales Group. Reported grades of up to 12.7% Cu, 2.7% Zn, 86 g/tonne (2.5 oz/ton) Ag, and 6.9 g/tonne (0.2 oz/ton) Au (fig. D-1).

120 **Quartz Hill** - A porphyry molybdenum deposit hosted in a 25 million-year-old composite felsic pluton. Probable reserves, according to Cominco Ltd., are 210 million tonnes (232 million tons) with a grade of 0.22% MoS_2, and possible reserves are 1.1 billion tonnes (1.2 billion tons) with 0.12% MoS_2 (fig. D-2).

121 **Niblack** - Volcanogenic Cu-Pb-Au-Ag massive sulfide deposit hosted in Precambrian(?) Wales Group or Ordovician to Silurian Descon Formation; produced more than 635,000 kg (1.4 million lb) Cu, 342 kg (11,000 oz) Au, and 467 kg (15,000 oz) Ag. Recent drilling results on Gold Zone include 50 m (164 ft) grading 3.77 g/tonne (0.11 oz/ton) gold, 0.41% copper, and 1.09% zinc (fig. D-1).

122 **Bokan Mountain** - Numerous U-Th prospects associated with Jurassic peralkaline intrusive complex; from 1955 to 1971, produced more than 108,840 tonnes (120,000 tons) ore that graded about 1% U_3O_8. Contains inferred reserves of about 36.2 million tonnes (40 million tons) of 0.126% Nb and up to 1% REE metals (fig. D-3).

123 **Kemuk Mountain** - Magmatic Fe-Ti deposit hosted in Cretaceous(?) pyroxenite. Inferred reserves of 2.17 billion tonnes (2.4 billion tons) that average 15 to 17% Fe, 2 to 3% TiO_2, and 0.16% P_2O_5 (fig. D-3).

124 **McLeod** - Porphyry Mo deposit that contains quartz-molybdenite fissure veins in quartz-feldspar porphyry. Chip samples contain up to 0.09% Mo (fig. D-2).

125 **Johnson River** - Epigenetic(?) quartz-sulfide stockwork or massive sulfide deposit hosted in volcaniclastic, pyroclastic, and volcanic rocks of Jurassic Talkeetna Formation. Deposit

has drilled out reserves at a $50/tonne cutoff with no cut of high Au assays, 997,542 tonnes (1,099,580 tons) grading 10.35 g/tonne (0.32 oz/ton) Au, 7.84 g/tonne (0.24 oz/ton) Ag, 0.76% Cu, 1.17 Pb, and 8.37% Zn (fig. D-3).

126 **Nimiuktuk River** - Small hill of massive, high-grade barite estimated to contain at least 1.36 million tonnes (1.5 million tons) barite. Widespread stream-sediment Ba anomalies in area indicate further barite potential (fig. D-1).

127 **Kensington** - Stockworks of quartz veins in sheared and chloritized quartz diorite produced 9,886 tonnes (10,900 tons) grading 6 g/tonne (0.18 oz/ton) Au prior to 1930. Recent reserve estimates indicate at least 10.4 million tonnes (11.5 million tons) grading 4.9 g/tonne (0.143 oz/ton) Au.

Subparallel Horrible vein system contains 3.56 million tonnes (3.93 million tons) grading 3.7 g/tonne (0.11 oz/ton) Au (fig. D-3).

128 **Jualin** - Five quartz-fissure veins in Cretaceous quartz diorite, more than 4,573 m (15,000 ft) of underground workings; produced 1,505 kg (48,387 oz) Au, mainly prior to 1930. Reserves estimated at 0.97 million tonnes (1.07 million tons) of 12 g/tonne (0.349 oz/ton) Au (fig. D-3).

129 **Pebble Copper** - Cu-Au porphyry with identified resource of 454 million tonnes (500 million tons) grading 0.35% Cu and 0.4 g/tonne (0.012 oz/ton) Au with Mo in the 0.03% to 0.04% range (fig. D-1).

Appendix E

Mining licenses issued by and received from the Alaska Department of Revenue, 1995

Entries include in this order: company name, (region), address, resource, site of operation, mining district, and license number. Alaska Peninsula Region (APR), Eastern Interior Region (EIR), Northern Region (NR), Southcentral Region (SCR), Southwestern Region (SWR), Southeastern Region (SER), Undistributed (UR), and Western Region (WR).

Administrative Services (EIR)
P.O. Box 70495
Fairbanks, AK 99707
Gold
Ketchum Creek
Circle district
ML 95 09151 1

American Copper & Nickel Co. (EIR)
4860 Robb St., #201
Wheat Ridge, CO 80033
Gold
Robertson River
Tok district
ML 95 09119 1

Anderson Mining (EIR)
1901 Cheechako Dr.
Fairbanks, AK 99709
Gold
Tenderfoot
Fairbanks district
ML 95 07191 1

Andreson, J. and Minder, R. (EIR)
P.O. Box 10263
Fairbanks, AK 99710
Gold
Dome Creek
Fairbanks district
ML 95 09135 1

Associated Construction (SCR)
P.O. Box 266
Anchor Point, AK 99556
Sand & gravel
Homer district
ML 95 99903 2

Aurora Mining Co. (EIR)
P.O. Box 103820
Anchorage, AK 99510
Gold
North Fork Harrison Creek
Circle district
ML 95 07332 1

Avalon Development Corp. (EIR)
P.O. Box 80268
Fairbanks, AK 99708
Gold
Fairbanks district
ML 95 09312 2

Bauer, Tod (SCR)
P.O. Box 871502
Wasilla, AK 99687
Gold
Eldorado Creek
Valdez Creek district
ML 95 06191 2

Beaver Loop Sand & Gravel (SCR)
Patrick & Mary Doyle
HC01 Box 1225
Kenai, AK 99611
Sand & gravel
Beaver Loop Road
Kenai district
ML 95 99904 1

Beerman, W.J. (SCR)
2416 S. 1st St.
Yakima, WA 98901
Gold
Big Four Creek
Chistochina district
ML 95 07160 2

Bering Straits Native Corp. (WR)
P.O. Box 1008
Nome, AK 99762
Sand & gravel
Hastings Creek
Cape Nome district
ML 95 99905 1

Bettisworth, Robert H. (EIR)
P.O. Box 80288
Fairbanks, AK 99708
Gold
Eureka Creek
Hot Springs district
ML 95 06891 2

Blue Sky Mining (EIR)
Don T. Kiehl
3210 Marneet Lane
North Pole, AK 99705
Gold
Gold King Creek
Bonnifield district
ML 95 05871 1

Board of Trade Inc. (WR)
P.O. Box 967
Nome, AK 99762
Sand & gravel
13 m east of Nome
Cape Nome district
ML 95 99908 1

Brexco (NR)
Brooks Range Exploration Co. Inc.
3240 Wiley Post Loop
Anchorage, AK 99517
Gold
Mt. Top Claims
Koyukuk district
ML 95 05875 2

Brown, John (EIR)
P.O. Box 30246
Central, AK 99730
Gold
Crooked Creek
Circle district
ML 95 09306 1

Buchholz, Gary (WR)
2004 Old Steese N.
Fairbanks, AK 99712
Gold
Bear Creek
Melozitna district
ML 95 05982 2

Busby, Michael & Alice Bayless (EIR)
P.O. Box 71
Chicken, AK 99732
Gold
Chicken Creek
Fortymile district
ML 95 06794 2

Calista Corporation (SWR)
601 W 5th Ave., Suite 200
Anchorage, AK 99501
Gold
Aniak-Tuluksak district
ML 95 06226 2

Chase, Ernest M. (SWR)
P.O. Box 141
Aniak, AK 99588
Gold
Flat Creek
Marshall district
ML 95 05611 2

Clara Bea Inc. (WR)
P.O. Box CDL
Kotzebue, AK 99752
Gold
Candle Creek
Fairhaven district
ML 95 07489 1

Colledge, Lyle (EIR)
P.O. Box 60478
Fairbanks, AK 99706
Gold
Bottom Dollar Creek
Circle district
ML 95 07108 1

Cominco Alaska Exploration Inc. (APR)
5660 B St.
Anchorage, AK 99518
Gold
Iliamna-Bristol Bay district
ML 95 05710 2

Cominco Alaska Exploration Inc. (APR)
5660 B St.
Anchorage, AK 99518
Gold
Iliamna-Bristol Bay district
ML 95 06118 2

Cominco Alaska Exploration Inc. (WR)
5660 B St.
Anchorage, AK 99518
Gold
Divide & Quartz Creeks
Cape Nome district
ML 95 09315 1

Cominco Alaska Exploration Inc. (WR)
5660 B St.
Anchorage, AK 99518
Gold
Cape Nome district
ML 95 09318 1

Conway, James P. (SCR)
HC02 Box 7660
Palmer, AK 99645
Gold
Poorman Creek
Yentna district
ML 95 05689 2

Cook's Mining (EIR)
P.O. Box 70456
Fairbanks, AK 99707
Gold
Fairbanks Creek
Fairbanks district
ML 95 05955 2

Cook's Mining (EIR)
P.O. Box 70456
Fairbanks, AK 99707
Gold
Fairbanks Creek
Fairbanks district
ML 95 06973 2

Cook, Fred (EIR)
P.O. Box 311
Delta Junction, AK 99737
Gold
Portage Creek
Bonnifield district
ML 95 09248 2

Cox, Cecil A. (EIR)
P.O. Box 79
Eagle, AK 99738
Gold
Fortymile River
Fortymile district
ML 95 09019 1

Depem (EIR)
105 Dunbar Ave.
Fairbanks, AK 99701
Gold
Twin and Pedro Creeks
Fairbanks district
ML 95 07405 1

Dick, Robert (EIR)
P.O. Box 16061
Two Rivers, AK 99716
Gold
N. Fork Twelvemile Creek
Circle district
ML 95 05841 1

Diehl, Ray (EIR)
P.O. Box 153
Yerington, NV 89447
Gold
Platt Creek
Bonnifield district
ML 95 09153 2

Double J Mining (EIR)
Judd Edgerton
P.O. Box 3885
Palmer, AK 99645
Gold
Napoleon Creek
Fortymile district
ML 95 07485 2

Elingson, Harold & Alice (EIR)
1818 Old Steese N.
Fairbanks, AK 99712
Gold
Goldstream Creek
Fairbanks district
ML 95 09059 1

Ellis, Ed (SCR)
P.O. Box 824
Cooper Landing, AK 99572
Gold
Lake Creek
Yentna district
ML 95 05707 2

Ellis, Ed (SCR)
12621 Hace St.
Anchorage, AK 99515
Gold
Lake Creek
Yentna district
ML 95 05607 2

Ellis, Ed (SCR)
12621 Hace St.
Anchorage, AK 99515
Gold
Independence Creek
Yentna district
ML 95 05705 2

Emerson, Robert C. (EIR)
1811 Phillips Field Rd.
Fairbanks, AK 99701
Gold
Fairbanks, St. Patrick, & Happy Creeks
Fairbanks district
ML 95 05913 1

Fair, Dan W. (EIR)
3457 Old Rich Hwy.
North Pole, AK 99705
Gold
Ptarmigan Creek
Circle district
ML 95 09144 2

Fisher, Paul S. (EIR)
P.O. Box 71041
Fairbanks, AK 99707
Gold
Doric Creek
Hot Springs district
ML 95 09317 2

Garber, John & Mildred (APR)
P.O. Box 4050
Kodiak, AK 99615
Gold
Beach Sands
Kodiak district
ML 95 05708 2

Gavora, Steven R. (EIR)
1967 Camomile Lane
Fairbanks, AK 99712
Gold
Fairbanks Creek
Fairbanks district
ML 95 09084 2

Glacier Six Enterprises (EIR)
Vic E. Justis
Rt. 2 Box 735
Soldotna, AK 99669
Gold
East Broxson Gulch
Fairbanks district
ML 95 07311 2

Gold Dust Mines (NR)
Del Ackels
P.O. Box 61520
Fairbanks, AK 99706
Gold
Big Creek
Chandalar district
ML 95 09036 1

Gold Star Mining (EIR)
P.O. Box 83200
Fairbanks, AK 99708
Gold
Eureka Creek
Hot Springs district
ML 95 09065 2

Goodson, Richard (EIR)
2605 E. 50th #8
Anchorage, AK 99507
Gold
South Fork Fortymile River
Fortymile district
ML 95 09052 2

Grant, Willie Eugene (EIR)
P.O. Box 40
Eagle, AK 99738
Gold
Seventymile River
Eagle district
ML 95 09304 2

Greger, Scott (SWR)
P.O. Box 101
Red Devil, AK 99656
Gold
Millie Creek
Aniak district
ML 95 06133 2

Groppel, Chris L. (EIR)
P.O. Box 1060
Delta Junction, AK 99737
Gold
Tenderfoot Creek
Fairbanks district
ML 95 05944 1

Gumaer, Mark & Robin (WR)
P.O. Box 1682
Nome, AK 99762
Gold
Dick Creek
Kougarok district
ML 95 07223 1

Gustafson, Bruce (EIR)
Geisen, James D.
1787 Bobanna Lane
North Pole, AK 99705
Gold
Cody Creek
Bonnifield district
ML 95 09175 1

Hall, John B. (NR)
P.O. Box 2700
Fairbanks, AK 99707
Gold
Linda
Koyukuk district
ML 95 07203 2

Ham Mining (EIR)
Harold Mitchell
P.O. Box 65
Chicken, AK 99732
Gold
Mosquito Fork, Fortymile River
Fortymile district
ML 95 07282 2

Hannah, John (EIR)
P.O. Box 61117
Fairbanks, AK 99706
Gold
Flume Creek
Fairbanks district
ML 95 09035 1

Hanson, Kenneth C. (EIR)
P.O. Box 10657
Fairbanks, AK 99710
Gold
Faith Creek
Circle district
ML 93 07047 2

Herzog, Martin M. (SCR)
3817 South Carson St., #428
Carson City, NV 89701
Gold
Cache Creek
Yentna district
ML 95 06073 2

Hopen, Al (EIR)
P.O. Box 74246
Fairbanks, AK 99707
Gold
Cleary Creek
Fairbanks district
ML 95 07937 1

Interior Alaskana Assoc. (EIR)
Richard L. Loud
P.O. Box 10570
Fairbanks, AK 99710
Gold
Harrison Creek
Circle district
ML 95 06006 1

Ireys, Charles G. (EIR)
P.O. Box 431
Northway, AK 99764
Gold
McArthur Creek
Fortymile district
ML 95 09126 2

Jackson Mining Co. (EIR)
936 Coppet St.
Fairbanks, AK 99709
Gold
Totatlanika River
Bonnifield district
ML 95 07469 2

Jim-Mar Mining Ventures (SCR)
James Luhrs, Jr.
3333 Lake Shore Dr., #8
Anchorage, AK 99517
Gold
Alfred Creek
Nelchina district
ML 95 05692 2

Johnson, Robert E. (EIR)
1208 Xenia St.
Bellingham, WA 98226
Gold
Little Eldorado Creek
Fairbanks district
ML 95 09308 2

Kennecott Greens Creek Mining (SER)
P.O. Box 32199
Juneau, AK 99803
All types
Greens Creek
Juneau district
ML 95 99902 2

Kile, Alvin & Eric (EIR)
P.O. Box 140424
Anchorage, AK 99514
Gold
Canyon Creek
Fortymile district
ML 95 05838 2

Kirkvold, Duwayne & Sally (NR)
707 Eberhardt Rd.
Fairbanks, AK 99712
Gold
Smalley to John R. Creek
Bettles district
ML 95 09323 1

Klopman, Jamin (SWR)
P.O. Box 243862
Anchorage, AK 99524
Gold
Taylor Creek
Aniak-Tuluksak district
ML 95 05681 2

Knutson, Theodore (EIR)
HC 31 Box 5191
Wasilla, AK 99654
Gold
Mammoth Creek
Circle district
ML 95 07323 2

Krzykowski, Ben (EIR)
P.O. Box 60091
Fairbanks, AK 99706
Gold
Big Eldorado Creek
Fairbanks district
ML 95 05981 2

Kurt's Construction (EIR)
Kurt A. Ueeck
HC 60, Box 3560
Delta Junction, AK 99737
Sand & gravel
Miltan Road area
Fairbanks district
ML 95 99907 1

L&R Mining (EIR)
P.O. Box 51
Salcha, AK 99714
Gold
Salcha River
Fairbanks district
ML 95 07458 2

Lance, Frank N. (NR)
P.O. Box 58337
Fairbanks, AK 99711
Gold
Nolan and Acme Creeks
Koyukuk-Nolan district
ML 95 09091 2

Las, Alan E. (EIR)
P.O. Box 10243
Fairbanks, AK 99710
Gold
No Grub Creek
Fairbanks district
ML 95 07362 1

Las, Alan E. (EIR)
P.O. Box 10243
Fairbanks, AK 99710
Gold
Smith and Pool Creeks
Fairbanks district
ML 95 05934 1

Leah, Clifford Jr. (EIR)
102 Draake Mews
Sonoma, CA 95476
Gold
South Fork Fortymile River
Fortymile district
ML 95 09145 2

Losonsky, Steve (EIR)
P.O. Box 80321
Fairbanks, AK 99708
Gold
Hunter Creek
Rampart district
ML 95 07328 2

Lounsbury Mining (NR)
P.O. Box 70983
Fairbanks, AK 99707
Gold
Union Creek
Koyukuk-Nolan district
ML 95 09165 2

M&B Mining & Exploration (EIR)
P.O. Box 241
Tok, AK 99780
Gold
Kenyon Creek
Fortymile district
ML 95 09140 2

Mahrt, Marvin E. (EIR)
2716 Wild Horse Lane
Minden, NV 89423
Gold
Daycreek/Caribou Creek
Bonnifield district
ML 95 05877 2

Mascott Mining Inc. (NR)
P.O. Box 264
Ridgway, CO 81432
Gold
Hammond River
Koyukuk-Nolan district
ML 95 05843 2

Mat Su Aggregate (SCR)
Merwin Arneson
P.O. Box 876010
Wasilla, AK 99687
Sand & gravel
Various
Anchorage-Hatcher Pass district
ML 95 99906 1

Matter, Mark (SWR)
P.O. Box 44
Aniak, AK 99557
Gold
Marvel Creek
Aniak-Tuluksak district
ML 95 05617 2

Misco-Walsh Mining Co. (SWR)
General Delivery
Flat, AK 99584
Gold
Golden Horn Lode and Otter Creek
Iditarod district
ML 95 05504 2

Miscovich, Andrew W. (EIR)
P.O. Box 71489
Fairbanks, AK 99707
Gold
Chatham Creek
Fairbanks district
ML 95 03014 2

Miscovich, Andrew W. (EIR)
P.O. Box 71489
Fairbanks, AK 99707
Gold
Alder Creek
Fairbanks district
ML 95 09324 1

Montgomery, Melvin or Lois (EIR)
6028 Mackay
Anchorage, AK 99518
Gold
Gilliand Creek
Fortymile district
ML 95 09168 1

Munsell, James L. (EIR)
P.O. Box 81155
Fairbanks, AK 99708
Gold
Little Minook Creek
Rampart district
ML 95 05862 2

N.B. Tweet & Sons (WR)
P.O. Box 1107
Nome, AK 99762
Gold
Kougarok River
Kougarok district
ML 95 05845 1

Niesen, Randy & Blair Smith (SCR)
P.O. Box 520155
Big Lake, AK 99652
Gold
Falls Creek
Yentna district
ML 95 05671 2

NYAC Mining (SWR)
Tuluksak Dredging Ltd.
415 W. 8th Ave.
Anchorage, AK 99501
Gold
Bear Creek
Aniak district
ML 95 05641 2

P&E Mining (EIR)
P.O. Box 10357
Fairbanks, AK 99710
Gold
Warwick Gulch
Tolovana district
ML 95 09128 2

Pacific Rainier Inc. (SWR)
10735 Stone Avenue N.
Seattle, WA 98133
Gold
Aniak district
ML 95 05598 1

Parr, Glen C. (EIR)
624 Maple
Shelton, WA 98584
Gold
Little Moose Creek
Bonnifield district
ML 95 06936 2

Patrick, Mike (EIR)
2015 S. Main St.
Corona, CA 91720
Gold
Fortymile River
Fortymile district
ML 95 09182 2

Paul & Co. (EIR)
P.O. Box 83102
Fairbanks, AK 99708
Gold
Frying Pan Creek
Circle district
ML 95 09167 1

Penz, Dave (SWR)
P.O. Box 29
Russian Mission, AK 99657
Gold
Buster Creek
Marshall district
ML 95 06216 2

Peterson, Doland E. (SER)
P.O. Box 172
Haines, AK 99827
Gold
Porcupine Creek
Porcupine district
ML 95 05700 2

Porter, James E. (SER)
P.O. Box 892
Craig, AK 99921
Gold
Ketchikan district
ML 95 05713 1

Prince Creek Mining Co. (SWR)
P.O. Box 2791
Palmer, AK 99645
Gold
Prince Creek
Iditarod district
ML 95 06092 2

Pushcar, Jerry (WR)
P.O. Box 1604
Nome, AK 99762
Gold
Lower Willow & Nelson Creeks
Solomon district
ML 95 01068 2

Quartz Creek Exploration Co. (SCR)
Milo Flothe
P.O. Box 242
Sterling, AK 99672
Gold
Quartz Creek
Hope district
ML 95 06208 2

Rhodes, James R. & Aline (SCR)
P.O. Box 2838
Kenai, AK 99611
Gold
Mills Creek
Yentna district
ML 95 05683 1

Roberts, Robert W. (EIR)
P.O. Box 225
Tok, AK 99780
Gold
Chicken Creek
Fortymile district
ML 95 07303 2

Roberts, Roger L. (SWR)
P.O. Box 7
Ophir-Takotna, AK 99675
Gold
Ophir & Gold Run Creeks
Innoko district
ML 95 08078 2

Rock Laundry Mining (EIR)
Bruce D. & Barbara Catt
P.O. Box 45
Central, AK 99730
Gold
Crooked Creek
Circle district
ML 95 09310 1

Roop, John Sr. (EIR)
9599 Brayton Dr., #416
Anchorage, AK 99507
Gold
Fortymile River
Fortymile district
ML 95 05974 1

Rosander Mining Co. (EIR)
P.O. Box 129
McGrath, AK 99627
Gold
Colorado Creek
Innoko district
ML 95 06806 2

Schwartz, John (EIR)
P.O.B ox 3089
Palmer, AK 99645
Gold
Our Creek
Fortymile district
ML 95 09322 1

Scofield, Walter P. (EIR)
P.O. Box 1178
Sandy, OR 97055
Gold
South Fork, Fortymile River
Fortymile district
ML 95 07451 2

Shepard, M. Dennis (EIR)
P.O. Box 82504
Fairbanks, AK 99708
Gold
Chatanika Drainage
Fairbanks district
ML 95 07026 1

Siks, Jan K. (EIR)
P.O. Box 695
Northport, WA 99157
Gold
South Fork Fortymile River
Fortymile district
ML 95 09183 2

Silverado Mines (U.S.) Inc. (EIR)
1111 W. Georgia, #505
Vancouver, BC V6E 4M3
Gold
Ester Dome Uplands
Fairbanks district
ML 95 07130 1

Silverado Mines (U.S.) Inc. (NR)
1111 w. Georgia, #505
Vancouver, BC V6E 4M3
Gold
Various
Koyukuk-Nolan district
ML 95 07084 2

Silverado Mines (U.S.) Inc. (NR)
111 W. Georgia, #505
Vancouver, BC V6E 4M3
Gold
Koyukuk-Nolan district
ML 95 09319 2

Slate Creek Mining Co. Inc. (EIR)
779 Hiway 603
Chehalis, WA 98532
Gold
Slate Creek
Rampart district
ML 95 07504 1

Slate Creek Mining Co. Inc. (EIR)
779 Hiway 603
Chehalis, WA 98532
Gold
Slate Creek
Rampart district
ML 95 07504 1

Smith, Carl R. (EIR)
P.O. Box 764
Tok, AK 99780
Gold
Eagle Creek
Fortymile district
ML 95 09058 2

Smith, William L. (SCR)
906 Cunningham St.
Anchorage, AK 99501
Gold
Silvertip Creek
Seward district
ML 95 06054 1

Stebbins Native Corp. (WR)
P.O. Box 70110
Stebbins, AK 99671
Sand & gravel
Cape Nome district
ML 99911 1

Stein, Robert (EIR)
105 Dunbar Ave.
Fairbanks, AK 99701
Gold
Gilmore Creek
Fairbanks district
ML 95 05909 1

Stultz, Donald D. (EIR)
P.O. Box 700
Nome, AK 99762
Gold
Oregon Creek
Cape Nome district
ML 95 05983 2

Swenson, Lloyd D. (NR)
1843 Bridgewater Dr.
Fairbanks, AK 99709
Gold
Slate Creek
Koyukuk-Nolan district
ML 95 07343 1

Taiga Mining Co. (WR)
4740 E. 115th Ave.
Anchorage, AK 99516
Gold
Clear Creek
Koyukuk-Hughes district
ML 95 09017 1

Taiga Mining Co. (WR)
4740 E. 115th Ave.
Anchorage, AK 99516
Gold
Bear Creek
Koyukuk-Hughes district
ML 95 09139 1

Taiga Mining Co. (WR)
4740 E. 115th Ave.
Anchorage, AK 99516
Gold
Ida Creek
Koyukuk-Hughes district
ML 95 08919 1

Taiga Mining Co. (WR)
4740 E. 115th Ave.
Anchorage, AK 99516
Gold
Aloha Creek
Koyukuk-Hughes district
ML 95 09016 1

The Gravel Station (SCR)
Ingeborg M. Turner
P.O. Box 3489
Palmer, AK 99645
Sand & gravel
Hornung property
Hatcher Pass district
ML 95 99913 1

The Gravel Station (SCR)
Ingeborg M. Turner
P.O. Box 3489
Palmer, AK 99645
Sand & gravel
Pippel Pit
Hatcher Pass district
ML 95 99912 1

Thompson, Kevin D. (SCR)
P.O. Box 875534
Wasilla, AK 99687
Gold
Surprise Creek
Valdez Creek district
ML 95 05634 2

Thurman Oil & Mining Inc. (EIR)
925 Aurora Dr.
Fairbanks, AK 99709
Gold
Rhode Island Creek
Hot Springs district
ML 95 09125 1

Thurman Oil & Mining Inc. (EIR)
925 Aurora Dr.
Fairbanks, AK 99709
Gold
Thanksgiving Creek
Hot Springs district
ML 95 09187 1

Tilleson Mining (WR)
P.O. Box 55823
North Pole, AK 99705
Gold
California Creek
Ruby district
ML 95 09192 2

Toohey, Cynthia-Camden (SCR)
P.O. Box 113
Girdwood, AK 99587
Gold
Crow Creek
Anchorage district
ML 95 05564 2

Treasure Creek Mining (EIR)
Donald M. Read
P.O. Box 71638
Fairbanks, AK 99707
Gold
Vault Creek
Fairbanks district
ML 95 07293 1

Treesh, James W. (EIR)
18550 Man-O-War Rd.
Eagle River, AK 99577
Gold
Squaw Gulch
Fortymile district
ML 95 05976 1

Turner, John L. (EIR)
1061 Dogwood St., #7
Fairbanks, AK 99701
Gold
Fortymile River
Fortymile district
ML 95 06832 1

Usibelli Coal Mine (EIR)
P.O. Box 1000
Healy, AK 99743
Coal
Gold Run Pass Mine
Bonnifield district
ML 95 99901 2

Wales Native Corporation (WR)
P.O. Box 529
Wales, AK 99785
Sand & gravel
NE Village Creek
Cape Nome district
ML 95 99909 1

Wales Native Corporation (WR)
P.O. Box 529
Wales, AK 99785
Sand & gravel
Boulder Creek
Cape Nome district
ML 95 99910 1

Wilde, Jim & Lore (EIR)
P.O. Box 30068
Central, AK 99730
Gold
Switch Creek
Circle district
ML 95 05998 2

Willford, Frank (EIR)
1079 Victor St.
North Pole, AK 99705
Gold
Hoosier Creek
Rampart district
ML 95 07358 2

Williams, Anthony (EIR)
9029 Rosedale
Juneau, AK 99801
Gold
Lower Vault Creek
Fairbanks district
ML 95 09327 1

Wood, Mike (EIR)
P.O. Box 75387
Fairbanks, AK 99707
Gold
Fairbanks district
ML 95 09309 2

Wrede, Ron (EIR)
P.O. Box 71
Central, AK 99730
Told
Switch Creek
Circle district
ML 95 09049 2

Wright, Richard L. (NR)
3410 Tilleson Way
North Pole, AK 99705
Gold
Gold Creek
Koyukuk-Nolan district
ML 95 09085 1

Wright, Robert P. (EIR)
P.O. Box 60783
Fairbanks, AK 99706
Gold
Last Chance Creek
Fairbanks district
ML 95 09155 2

APPENDIX F
Primary metals production in Alaska, 1880-1995[a]

Year	Gold		Silver		Mercury		Antimony		Tin		Lead		Zinc		Platinum		Copper		Chromium	
	(oz)	(m$)	(oz)	(t$)	(flask[b])	(t$)	(lb)	(t$)	(lb)	(t$)	(tons)	(t$)	(tons)	(t$)	(oz)	(t$)	(lb)	(m$)	(tons)	(t$)
1880-1899	1,153,889	23.85	496,101	329.0	--	--	--	--	--	--	250	17.0	--	--	--	--	--	--	--	--
1900	395,030	8.17	73,300	45.5	--	--	--	--	--	--	40	3.4	--	--	--	--	--	--	--	--
1901	335,369	6.93	47,900	28.6	--	--	--	--	--	--	40	3.4	--	--	--	--	250,000	0.04	--	--
1902	400,709	8.28	92,000	48.5	--	--	--	--	30,000	8.0	30	2.5	--	--	--	--	360,000	0.04	--	--
1903	420,069	8.68	143,600	77.8	--	--	--	--	50,000	14.0	30	2.5	--	--	--	--	1,200,000	0.16	--	--
1904	443,115	9.16	198,700	114.9	--	--	--	--	28,000	8.0	30	2.5	--	--	--	--	2,043,586	0.28	--	--
1905	756,101	15.63	132,174	80.2	--	--	--	--	12,000	4.0	30	2.6	--	--	--	--	4,805,236	0.75	--	--
1906	1,066,030	22.04	203,500	136.4	--	--	--	--	68,000	38.6	30	3.4	--	--	--	--	5,871,811	1.13	--	--
1907	936,043	19.35	149,784	98.8	--	--	--	--	44,000	16.8	30	3.2	--	--	--	--	6,308,786	1.26	--	--
1908	933,290	19.29	135,672	71.9	--	--	--	--	50,000	15.2	40	3.4	--	--	--	--	4,585,362	0.61	--	--
1909	987,417	20.41	147,950	76.9	--	--	--	--	22,000	7.6	69	5.9	--	--	--	--	4,124,705	0.54	--	--
1910	780,131	16.13	157,850	85.2	--	--	--	--	20,000	8.3	75	6.6	--	--	--	--	4,241,689	0.54	--	--
1911	815,276	16.85	460,231	243.9	--	--	--	--	122,000	52.8	51	4.5	--	--	--	--	27,267,778	3.40	--	--
1912	829,436	17.14	515,186	316.8	--	--	--	--	260,000	119.6	45	4.1	--	--	--	--	29,230,491	4.82	--	--
1913	755,947	15.63	362,563	218.9	--	--	--	--	100,000[c]	44.1[c]	6	0.6	--	--	--	--	21,659,958	3.35	--	--
1914	762,596	15.76	394,805	218.3	--	--	--	--	208,000	66.6	28	1.3	--	--	--	--	21,450,628	2.85	--	--
1915	807,966	16.70	1,071,782	543.3	--	--	520,000	W	204,000	78.8	437	41.1	--	--	--	--	86,509,312	15.14	--	--
1916	834,068	17.24	1,379,171	907.4	--	--	1,200,000	W	278,000	121.0	820	113.2	--	--	8	0.7	119,654,839	29.50	--	--
1917	709,049	14.66	1,239,150	1,020.6	--	--	500,000	W	200,000	123.3	852	146.6	--	--	53	5.5	88,793,400	24.40	1,100	W
1918	458,641	9.48	847,789	847.8	--	--	540,000	W	136,000	118.0	564	80.1	--	--	284	36.6	69,224,951	17.10	1,100	W
1919	455,984	9.42	629,708	705.3	--	--	--	--	112,000	73.4	687	72.1	--	--	569	73.7	47,220,771	8.80	--	--
1920	404,683	8.37	953,546	1,039.7	--	--	--	--	32,000	16.1	875	140.0	--	--	1,478	160.1	70,435,363	13.00	--	--
1921	390,558	8.07	761,085	761.1	45	1.5	--	--	8,000	2.4	759	68.3	--	--	40	2.7	57,011,597	7.40	--	--
1922	359,057	7.42	729,945	729.9	--	--	--	--	2,800	0.9	377	41.5	--	--	29	2.8	77,967,819	10.50	--	--
1923	289,539	5.98	814,649	668.1	--	--	--	--	3,800	1.6	410	57.4	--	--	--	--	85,920,645	12.60	--	--
1924	304,072	6.29	669,641	448.6	2	0.3	--	--	14,000	7.1	631	100.9	--	--	28	2.6	74,074,207	9.70	--	--
1925	307,679	6.36	698,259	482.4	44	3.6	W	W	28,600	15.4	789	140.6	--	--	10	1.2	73,055,298	10.30	--	--
1926	324,450	6.70	605,190	377.0	22	1.7	W	W	16,000	10.4	778	124.4	--	--	3,570	274.5	67,778,000	9.49	--	--
1927	286,720	5.97	350,430	215.0	--	--	--	--	53,400	34.0	1,008	127.0	--	--	--	--	55,343,000	7.25	--	--
1928	331,140	6.85	351,730	187.0	--	--	--	--	82,000	41.0	1,019	118.0	--	--	120	9.0	41,421,000	5.96	--	--
1929	375,438	7.76	472,900	252.0	4	0.5	--	--	77,200	35.0	1,315	166.0	--	--	475	32.0	40,570,000	7.13	--	--
1930	408,983	8.47	408,570	157.3	--	--	--	--	29,400	9.3	1,365	136.5	--	--	--	--	32,651,000	4.24	--	--
1931	459,000	9.51	352,000	102.0	15	1.2	--	--	8,200	2.0	1,660	126.0	--	--	393	14.0	22,614,000	1.88	--	--
1932	493,860	10.20	234,050	66.0	8	0.5	--	--	--	--	1,260	75.6	--	--	--	--	8,738,500	0.55	--	--
1933	469,286	9.70	154,700	55.0	--	--	--	--	5,800	2.3	1,157	85.6	--	--	605	18.6	29,000	0.02	--	--
1934	537,281	8.78	154,700	100.0	--	--	--	--	8,200[c]	4.3	839	62.1	--	--	2,555	85.6	121,000	0.06	--	--
1935	469,495	16.43	286,600	206.0	--	--	--	--	98,800	49.8	815	65.2	--	--	8,685	259.6	15,056,000	1.25	--	--
1936	540,580	18.92	484,306	375.0	--	--	--	--	226,000	105.0	941	86.6	--	--	5,654	241.9	39,267,000	3.72	--	--
1937	627,940	21.98	494,340	382.0	--	--	962,000	147.6	372,000[c]	202.3[c]	823	97.1	--	--	9,823	313.4	36,007,000	4.74	--	--
1938	662,000	23.17	479,853	310.0	8	0.6	444,000	54.8	210,000	89.1	994	91.5	--	--	41,000	2,460.0	29,760,000	2.98	--	--
1939	676,780	23.68	201,054	136.5	--	--	210,000	25.9	66,000	38.0	937	88.1	--	--	33,900	2,034.0	278,500	0.04	--	--
1940	755,900	26.45	191,679	136.3	156[c]	130.9	306,000	42.8	92,000	52.0	840	72.0	--	--	28,886	1,093.0	110,000	0.02	--	--
1941	692,314	24.23	199,700	142.0	W	W	774,000	87.3	93,600[c]	61.0[c]	742	58.0	--	--	22,630	813.0	144,000	0.02	--	--
1942	487,657	17.07	135,200	96.0	W	W	316,000	41.0	5,600	2.5	523	44.0	--	--	22,000	779.0	48,000	0.01	--	--
1943	99,583	3.49	31,700	22.0	786	153.4	368,000	33.3	2,000[c]	1.0[c]	200	22.0	--	--	27,900	1,020.0	54,000	0.01	5,564	186.3
1944	49,296	1.73	15,240	10.8	841	165.0	70,080	30.0	--	--	44	5.8	--	--	33,616	2,017.0	4,000	0.01	1,845	64.6
1945	68,117	2.38	9,983	6.2	275	180.0	W	W	--	--	11	1.8	--	--	22,949	1,377.0	10,000	0.01	--	--
1946	226,781	7.93	41,793	26.3	699	68.7	W	W	--	--	115	25.0	--	--	22,882	1,418.7	4,000	0.01	--	--
1947	279,988	9.79	66,150	46.3	127	10.6	52,000	16.1	2,000	2.2	255	76.5	226	0.15	13,512	1,351.2	24,000	0.06	--	--
1948	248,395	8.69	67,341	58.7	108	7.8	88,000	29.3	10,000	10.8	317	88.9	226	0.15	13,741	1,209.2	28,000	0.07	--	--
1949	229,416	8.03	36,056	32.4	102	7.9	88,000	31.3	114,000	100.8	49	11.2	226	0.15	17,169	1,545.2	7,700	0.02	--	--

APPENDIX F
continued

Year	Gold (oz)	Gold (m$)	Silver (oz)	Silver (t$)	Mercury (flask[b])	Mercury (t$)	Antimony (lb)	Antimony (t$)	Tin (lb)	Tin (t$)	Lead (tons)	Lead (t$)	Zinc (tons)	Zinc (t$)	Platinum (oz)	Platinum (t$)	Copper (lb)	Copper (m$)	Chromium (tons)	Chromium (t$)
1950	289,285	10.13	52,638	48.0	W	W	W	W	158,000	170.3	144	27.5	--	--	W	W	12,000	0.03	--	--
1951	239,628	8.38	32,870	29.8	28	W	1,718,000	2,061.6	138,000	198.0	21	7.2	--	--	W	W	2,000	0.01	--	--
1952	240,571	8.42	31,825	28.7	40	W	740,000	1,406.0	180,000	243.9	1	0.3	--	--	W	W	--	--	W	W
1953	253,771	8.88	35,387	32.1	1,023	270.0	W	W	98,000	105.9	--	--	--	--	17,489	1,696.4	--	--	W	W
1954	248,511	8.70	33,694	31.8	1,046	276.0	--	--	398,000	409.9	--	--	--	--	18,790	1,615.9	8,000	0.02	2.953	208.0
1955	249,294	8.73	33,693	30.4	43	12.0	--	--	172,000	182.5	1	0.3	--	--	17,253	1,466.5	2,000	0.01	7.082	625.3
1956	204,300	7.33	26,700	24.1	3,414	837.0	134,400	150.0	--	--	1	0.3	--	--	17,934	1,829.3	--	--	7,200	711.5
1957	215,467	7.54	28,862	26.0	5,461	1,349.0	71,120	80.0	--	--	9	3.0	--	--	15,479	1,377.6	--	--	4,207	431.0
1958	186,000	6.53	24,000	22.0	3,380	774.0	--	--	--	--	--	--	--	--	10,284	647.9	10,000	0.03	--	--
1959	171,000	5.99	22,000	20.0	3,750	852.0	--	--	--	--	--	--	--	--	10,698	770.3	72,000	0.04	--	--
1960	180,000	6.30	23,000	21.0	4,450	938.0	W	W	--	--	--	--	--	--	13,352	1,054.8	82,000	0.04	--	--
1961	114,228	3.99	--	--	4,080	816.0	--	--	--	--	--	--	--	--	16,133	1,274.5	184,000	0.06	--	--
1962	165,142	5.78	--	--	3,843	711.0	--	--	--	--	--	--	--	--	12,520	951.5	--	--	--	--
1963	99,000	3.48	6,100	9.0	400	76.0	W	W	--	--	5	1.1	--	--	12,322	961.1	--	--	--	--
1964	58,000	2.05	7,200	6.0	303	95.0	46,400	60.3	--	--	--	--	--	--	13,010	1,522.2	22,000	0.01	--	--
1965	43,000	1.51	5,000	6.0	180	104.0	46,400	60.3	--	--	14	4.0	--	--	10,365	1,368.2	64,000	0.03	--	--
1966	27,325	0.96	7,000	9.0	185	101.0	16,000	19.2	--	--	19	4.3	--	--	9,033	1,273.7	--	--	--	--
1967	22,948	0.80	6,000	9.0	161	79.0	20,000	22.0	--	--	--	--	--	--	7,888	1,238.4	W	W	--	--
1968	21,000	0.81	3,000	6.5	156	78.0	6,000	6.0	--	--	--	--	--	--	8,433	1,652.9	--	--	--	--
1969	21,227	0.88	2,000	4.2	238	100.0	94,000	100.0	--	--	2	0.5	--	--	8,500	2,321.2	--	--	--	--
1970	38,400	1.38	4,000	7.0	3,100	1,260.0	365,000	410.0	--	--	--	--	--	--	6,015	925.1	W	W	--	--
1971	34,000	1.36	2,000	4.0	675	285.0	68,000	74.0	34,000	47.0	--	--	--	--	5,407	625.6	--	--	--	--
1972	8,639	0.56	1,000	2.0	125	44.0	160,000	185.0	W	W	--	--	--	--	6,478	985.5	--	--	--	--
1973	15,000	1.86	13,200	22.0	70	52.5	420,000	515.0	10,000	12.0	6	2.0	--	--	5,524	964.5	--	--	--	--
1974	16,000	2.56	1,500	3.5	70	52.5	80,000	95.0	W	W	--	--	--	--	4,351	1,067.0	--	--	--	--
1975	14,980	3.35	6,000	25.0	--	--	120,000	145.0	22,000	60.0	--	--	--	--	3,726	623.3	--	--	--	--
1976	22,887	6.90	6,500	24.0	--	--	160,000	165.0	W	W	14	6.0	--	--	3,212	515.2	--	--	8,000[c]	1,200.0[c]
1977	50,000	7.80	8,000	20.0	--	--	W	W	W	W	--	--	--	--	6,891	1,119.8	--	--	--	--
1978	60,000	12.00	6,000	50.0	--	--	W	W	W	W	--	--	--	--	--	--	--	--	--	--
1979	65,000	18.00	6,500	93.0	--	--	100,000	125.0	100,000	830.0	--	--	--	--	--	--	--	--	--	--
1980	75,000	32.00	7,500	111.0	--	--	--	--	120,000	984.0	31	29.0	--	--	--	--	--	--	--	--
1981	134,200	55.20	13,420	111.3	W	W	--	--	106,000	700.0	--	--	--	--	900	200.0	--	--	--	--
1982	175,000	69.90	22,000	198.0	--	--	--	--	198,000	1,365.0	--	--	--	--	W	W	--	--	--	--
1983	169,000	67.60	33,200	332.0	--	--	22,400	45.0	215,000	1,100.0	--	--	--	--	W	W	--	--	--	--
1984	175,000	62.13	20,000	159.0	5	1.5	135,000	225.8	225,000	400.0	--	--	--	--	W	W	--	--	--	--
1985	190,000	61.18	28,500	171.0	27	10.0	65,000	98.0	300,000	650.0	--	--	--	--	--	--	--	--	--	--
1986	160,000	60.80	24,000	134.4	12	2.8	45,000	67.5	340,000	890.0	--	--	--	--	W	W	--	--	--	--
1987	229,707	104.51	54,300	391.0	--	--	--	--	288,000	460.0	--	--	--	--	W	W	--	--	--	--
1988	265,500	112.84	47,790	282.0	W	W	--	--	300,000	950.0	--	--	--	--	25	13.8	--	--	--	--
1989	284,617	108.7	5,211,591	27,300.0	--	--	--	NR	194,000	672.0	9,585	7,700.0	19,843	29,400.0	--	--	--	--	--	--
1990	231,700	89.20	10,135,000	50,675.0	--	--	--	--	57,000	200.0	44,220	30,954.0	181,200	253,680.0	--	--	--	--	--	--
1991	243,900	88.29	9,076,854	39,110.0					6,800	22.1	69,591	33,403.7	278,221	278,221.0	15	5.3	--	--	--	--
1992	262,530	88.46	9,115,755	34,913.0	--	--	--	--	1,500	5.9	68,664	31,585.0	274,507	301,957.7	--	--	--	--	--	--
1993	191,265	68.64	5,658,958	24,333.0	--	--	--	--	21,000	50.6	38,221	13,759.6	268,769	236,516.7	3	1.2	--	--	--	--
1994	182,100	70.29	1,968,000	10,391.0	--	--	--	--	--	--	36,447	25,512.9	329,003	296,102.7	5	2.1	--	--	--	--
1995	141,882	56.04	1,225,730	6,655.0	--	--	--	--	--	--	58,098	34,428.6	359,950	345,552.0	1	0.4	--	--	--	--
Other[c]	--	--	--	--	1,438	--	--	--	--	--	--	--	--	--	71,946	17,091.9	--	--	--	--
TOTAL (metric)	**33,378,148 (1,038 tonnes)**	**1,999.9**	**62,409,573 (1,941 tonnes)**	**209,724.4**	**40,945 (1,411,521 kg)**	**9,910.5**	**11,070,800 (5,021 tonnes)**	**6,655.1**	**7,287,700 (3,305 tonnes)**	**12,523.5**	**351,126 (318,542 tonnes)**	**180,352.9**	**1,712,171 (1,553,282 tonnes)**	**1,741,430.6**	**668,546[d] (20,793 kg)**	**65,814.9**	**1,373,793,932 (632,152 tonnes)**	**228.04**	**39,951 (35,419 tonnes)**	**3,426.7**

[a]From published and unpublished state and federal documents.
[b]76-lb flask.
[c]Not traceable by year.
[d]Crude platinum; total production of refined metal is about 575,000 oz.

W = Withheld.
-- = Not reported.
t$ = Thousand dollars.
m$ = Million dollars.

APPENDIX G

Production of industrial minerals, coal, and other commodities in Alaska, 1880-1995

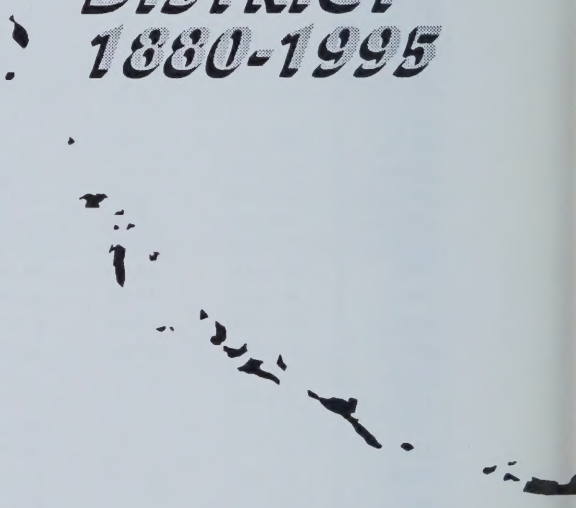
Year	Coal		Sand and gravel		Building stone[a]		Barite		Other[b]
	s. tons	m$	s. tons	m$	s. tons	m$	s. tons	t$	$
1880-1899[c]	19,429	0.14	--	--	7,510	0.04	--	--	--
1900	1,200[d]	0.02[d]	--	--	510	0.01	--	--	--
1901	1,300[d]	0.02[d]	--	--	700	0.01	--	--	500
1902	2,212[d]	0.02[d]	--	--	800	0.01	--	--	255
1903	1,447	0.01	--	--	920	0.01	--	--	389
1904	1,694	0.01	--	--	1,080	0.02	--	--	2,710
1905	3,774	0.02	--	--	970	0.02	--	--	740
1906	5,541	0.02	--	--	2,863	0.03	--	--	19,965
1907	10,139	0.05		--	3,899	0.03	--	--	54,512
1908	3,107[d]	0.01[d]	--	--	2,176	0.03	--	--	81,305
1909	2,800	0.02	--	--	1,400	0.01	--	--	86,027
1910	1,000[d]	0.01[d]	--	--	W	W	--	--	96,408
1911	900[d]	0.01[d]	--	--	W	W	--	--	145,739
1912	355[d]	0.01[d]	--	--	W	W	--	--	165,342
1913	2,300	0.01	--	--	W	W	--	--	286,277
1914	1,190	0.01	--	--	W	W	--	--	199,767
1915	1,400	0.03	--	--	W	W	--	--	205,061
1916	12,676	0.05	--	--	W	W	--	--	326,731
1917	54,275	0.27	--	--	W	W	--	--	203,971
1918	75,816	0.41	--	--	W	W	--	--	171,452
1919	60,894	0.35	--	--	50,014	0.29	--	--	214,040
1920	61,111	0.36	--	--	37,044	0.27	--	--	372,599
1921	76,817	0.49	--	--	59,229	0.31	--	--	235,438
1922	79,275	0.43	--	--	54,251	0.30	--	--	266,296
1923	119,826	0.76	--	--	83,586	0.41	--	--	229,486
1924	99,663	0.56	--	--	35,294	0.26	--	--	348,728
1925	82,868	0.40	--	--	32,193	0.19	--	--	454,207
1926	87,300	0.46	--	--	33,283	0.20	--	--	423,000
1927	104,300	0.55	--	--	41,424	0.22	--	--	--
1928	126,100	0.66	--	--	63,347	0.31	--	--	--
1929	100,600	0.53	--	--	54,766	0.26	--	--	194,000
1930	120,100	0.63	--	--	66,234	0.33	--	--	157,300
1931	105,900	0.56	--	--	59,175	0.29	--	--	108,000
1932	102,700	0.53	--	--	54,167	0.27	--	--	223,400
1933	96,200	0.48	--	--	56,291	0.28	--	--	--
1934	107,500	0.45	--	--	64,234	0.36	--	--	46,155
1935	119,425	0.50	--	--	74,049	0.38	--	--	46,755
1936	136,593	0.57	--	--	76,379	0.38	--	--	45,807
1937	131,600	0.55	--	--	50,057	0.25	--	--	147,048
1938	159,230	0.62	--	--	189,090	0.21	--	--	125,302
1939	143,549	0.60	42,332	0.02	--	--	--	--	--
1940	170,174	0.88	515,011	0.10	--	--	--	--	--
1941	241,250	0.97	530,997	0.09	--	--	--	--	1,367,000
1942	246,600	0.99	W	W	--	--	--	--	1,124,000
1943	289,232	1.84	W	W	--	--	--	--	--
1944	352,000	2.37	712,496	0.50	--	--	--	--	2,350,309
1945	297,644	1.87	W	W	--	--	--	--	5,910,704
1946	368,000	2.36	W	W	--	--	--	--	2,005,241
1947	361,220	2.55	W	W	219,000	1.00	--	--	5,927,319
1948	407,906	2.79	W	W	67,341	0.33	--	--	1,257,699
1949	455,000	3.60	W	W	W	W	--	--	7,181,886

[a]Building-stone production figures for 1880-1937 are for the southcentral and interior regions of Alaska only.
[b]Includes 2.4 million lb U_3O_8 (1955-71); 505,000 tons gypsum (1905-26); 286,000 lb WO_3 (intermittently 1916-80); 94,000 lb asbestos (1942-44); 540,000 lb graphite (1917-18 and 1942-50); and undistributed amounts of zinc, jade, peat, clay, soapstone, miscellaneous gemstones, and other commodities (1880-1993).
[c]Production not traceable by year.
[d]When state (territorial) and federal figures differ significantly, state figures are used. Figures for sand and gravel production in 1974 show state estimates (118,740,000 s. tons; 240.94 m$) and federal (42,614,000 s. tons; 88.96 m$). The federal estimate was not added to total production.
[e]Marble quarried on Prince of Wales Island, southeastern Alaska (1900-41).
m$ = Million dollars.
t$ = Thousand dollars.
-- = Not reported.
W = Withheld.

Year	Coal		Sand and gravel		Building stone[a]		Barite		Other[b]
	s. tons	m$	s. tons	m$	s. tons	m$	s. tons	t$	$
1950	421,455	3.03	3,050,020	2.38	W	W	--	--	2,100,000
1951	494,333	3.77	6,818,000	3.54	W	W	--	--	3,600,000
1952	648,000	5.77	6,817,800	3.54	W	W	--	--	9,052,000
1953	861,471	8.45	7,689,014	5.08	47,086	0.17	--	--	1,231,350
1954	666,618	6.44	6,639,638	6.30	283,734	0.47	--	--	1,572,150
1955	639,696	5.76	9,739,214	8.24	265,740	0.29	--	--	1,552,427
1956	697,730	6.37	9,100,000	8.30	50,000	0.02	--	--	1,551,500
1957	842,338	7.30	6,096,000	8.79	528,000	1.95	--	--	2,751,000
1958	759,000	6.93	4,255,000	3.87	615,000	2.07	--	--	695,000
1959	602,000[d]	5.88[d]	5,600,000	5.10	54,000	0.20	--	--	1,338,000
1960	669,000[d]	5.95[d]	5,892,000	5.35	80,000	0.30	--	--	975,000
1961	650,000[d]	5.87[d]	5,241,000	4.19	--	--	--	--	--
1962	675,000[d]	6.41[d]	5,731,000	5.36	--	--	--	--	--
1963	853,000	5.91	16,926,000	22.01	W	W	W	W	2,589,000
1964	745,000	5.01	26,089,000	18.49	W	W	W	W	4,912,000
1965	860,000[d]	5.88[d]	29,959,000	33.93	W	W	W	W	5,296,000
1966	927,000	6.95	17,457,000	21.79	W	W	44,000	350.0	6,167,000
1967	930,000	7.18	22,300,000	26.25	W	W	W	W	4,924,000
1968	812,000[d]	5.03[d]	17,515,000	20.73	W	W	91,000	W	4,117,000
1969	728,000[d]	4.65[d]	16,205,000	18.62	1,954,000	3.90	90,000	850.0	5,163,000
1970	786,000[d]	5.28[d]	20,375,000[d]	26.07[d]	6,470,000	10.01	134,000[d]	1,875.0	7,994,000
1971	748,000[d]	5.05[d]	26,391,000	41.99	2,658,000	5.07	102,000[d]	1,075.0	--
1972	720,000[d]	6.26[d]	14,187,000	15.21	652,000	3.01	W	W	--
1973	700,000[d]	6.23[d]	19,350,000	19.01	5,967,000	12.00	112,000	1,792.0	12,846,000
1974	700,000	7.34	118,740,000[d]	240.94[d]	5,484,000	12.95	110,000	1,895.0	14,495,000
			42,614,000	88.96					
1975	766,000	7.81	48,145,000	95.78	8,877,000	26.65	2,000[d]	30.0	12,731,000
1976	705,000	8.00	74,208,000[d]	204.73[d]	6,727,000	20.09	W	W	14,019,000
1977	780,000[d]	12.00[d]	66,126,000	134.25	4,008,000	17.47	--	--	14,486,000
1978	750,000	15.00	51,100,000	122.00	3,437,000	14.65	22,000	750.0	--
1979	750,000	16.00	50,900,000	104.90	3,650,000	15.45	20,000	800.0	930,000
1980	800,000	16.00	40,000,000	86.00	3,700,000	15.40	50,000	2,000.0	97,500
1981	800,000	17.60	46,000,000	88.20	4,200,000	19.30	--	--	256,000
1982	830,000	18.00	45,000,000	91.00	3,400,000	15.60	--	--	150,000
1983	830,000	18.00	50,000,000	105.00	5,270,000	25.00	--	--	242,000
1984	849,161	23.75	27,000,000	95.00	2,700,000	16.00	--	--	875,875
1985	1,370,000	39.73	28,184,080	112.06	2,500,000	12.00	--	--	559,000
1986	1,492,707	40.10	20,873,110	75.76	4,200,000	20.32	--	--	384,800
1987	1,508,927	42.35	16,696,374	42.66	1,805,000	11.62	--	--	388,400
1988	1,551,162	44.30	17,264,500	48.75	3,600,000	24.65	--	--	389,000
1989	1,452,353	41.46	14,418,000	39.88	2,914,000	20.34	--	--	1,492,000
1990	1,576,000	44.99	15,013,500	40.82	3,200,000	22.10	--	--	400,000
1991	1,540,000	39.00	14,160,011	45.45	3,000,000	22.50	--	--	462,000
1992	1,531,800	38.30	14,599,746	42.20	2,900,000[e]	22.97	--	--	430,000
1993	1,586,545	38.10	13,162,402	40.64	3,561,324	26.21	--	--	465,000
1994	1,490,000	36.75	13,518,321	40.95	3,843,953	27.04	--	--	459,500
1995	1,640,000	41.30	9,847,550	30.89	2,811,152	22.13	--	--	182,500
Other[d]	--	--	--	--	2,300,000[e]	W	79,000	W	--
TOTAL (metric)	**48,348,428 (43,861,693 tonnes)**	**779.65**	**1,106,180,114 (1,003,526,599 tonnes)**	**2,262.69**	**109,256,265 (99,117,284 tonnes)**	**476.23**	**856,000 (776,563 tonnes)**	**11,417.0**	**177,129,872**

	Mining districts[a]	Production (in refined troy ounces) Total production	Placer gold	Lode gold
1.	Lisburne district	0	0	0
2.	Noatak district	7,800	7,800	0
3.	Wainwright district	0	0	0
4.	Barrow district	0	0	0
5.	Colville district	0	0	0
6.	Canning district	0	0	0
7.	Sheenjek district	0	0	0
8.	Chandalar district	64,367	46,967	17,400
9.	Koyukuk-Nolan district	340,152	340,152	0
10.	Shungnak district	15,000	15,000	0
11.	Squirrel River district	40,600	40,600	0
12.	Fairhaven-Inmachuk district	347,671	347,671	0
13.	Candle district	253,130	253,130	0
14.	Serpentine district	4,220	4,220	0
15.	Port Clarence district	40,946	40,946	0
16.	Kougarok district	173,965	173,965	0
17.	Cape Nome district	4,874,449	4,874,449	0
18.	Council and Solomon districts	1,046,513	1,019,513	27,000
19.	Koyuk district	84,132	84,132	0
20.	Koyukuk-Hughes district	231,888	231,888	0
21.	Kaiyuh district	5,400	5,400	0
22.	Anvik district[b]	0	0	0
23.	Marshall district	124,219	124,219	0
24.	Bethel district	42,945	42,945	0
25.	Goodnews Bay district	29,700	29,700	0
26.	Aniak-Tuluksak district[c]	568,601	568,601	0
27.	Iditarod district	1,561,524	1,558,594	2,930
28.	McGrath-McKinley district	196,713	131,000	65,713
29.	Innoko-Tolstoi district	706,267	706,111	156
30.	Ruby-Poorman district	476,751	476,751	0
31.	Kantishna district	99,307	91,401	7,906
32.	Hot Springs district	568,632	568,632	0
33.	Gold Hill-Melozitna district[d]	11,409	11,409	0
34.	Rampart district	196,261	196,261	0
35.	Tolovana-Livengood district	496,417	496,417	0
36.	Yukon Flats district	0	0	0
37.	Circle district	1,027,607	1,027,607	0
38.	Black district	0	0	0
39.	Eagle district	52,000	52,000	0
40.	Fortymile district	534,974	534,770	204
41.	Chisana and Nabesna districts	144,500	78,000	66,500
42.	Tok district	0	0	0
43.	Goodpaster district	2,350	2,050	300
44.	Fairbanks district	8,326,982	8,022,434	304,548
45.	Bonnifield district	81,467	74,767	6,700
46.	Richardson district	120,770	118,470	2,300
47.	Delta River district	6,547	6,547	0
48.	Chistochina district	181,261	181,261	0
49.	Valdez Creek district	508,454	506,873	1,581
50.	Yentna-Cache Creek district	197,214	197,214	0
51.	Redoubt district	105	105	0
52.	Iliamna-Bristol Bay district	1,570	1,570	0
53.	Kodiak and Unga Island district	112,400	4,800	107,600
54.	Homer district	16	16	0
55.	Hope-Sunrise-Seward district	132,221	67,221	65,000
56.	Anchorage district[e]	0	0	0
57.	Willow Creek-Hatcher Pass district	664,853	55,853	609,000
58.	Prince William Sound district	137,715	15	137,700
59.	Nelchina district	14,115	14,115	0
60.	Nizina district	148,500	148,500	0
61.	Yakataga district	18,040	18,040	0
62.	Yakutat district[f]	13,200	2,200	11,000
63.	Porcupine district	80,699	80,699	0
64.	Juneau and Admiralty districts	7,260,248	80,000	7,180,248
65.	Chichagof district	770,000	0	770,000
66.	Petersburg-Sumdum district	15,000	15,000	0
67.	Kupreanof district	0	0	0
68.	Hyder district	219	219	0
69.	Ketchikan district	62,000	4,000	58,000
	SUBTOTAL	33,224,006	23,782,220	9,441,786
	Undistributed[g]	154,142		
	Total Production (troy ounces)	33,378,148		
	(metric tonnes)	(1,038)		

TOTAL GOLD PRODUCTION IN ALASKA BY MINING DISTRICT 1880-1995



[a]Mining district names and boundaries revised slightly from those defined by Ransome and Kerns (1954) and Cobb (1973). Sources of data: U.S. Geological Survey, U.S. Bureau of Mines, and Territorial Department of Mines Records 1880-1930; U.S. Mint Records 1930-1969; State of Alaska production records 1970-1995. Entries of "0" generally mean no specific records are available.

[b]Included in Marshall district.

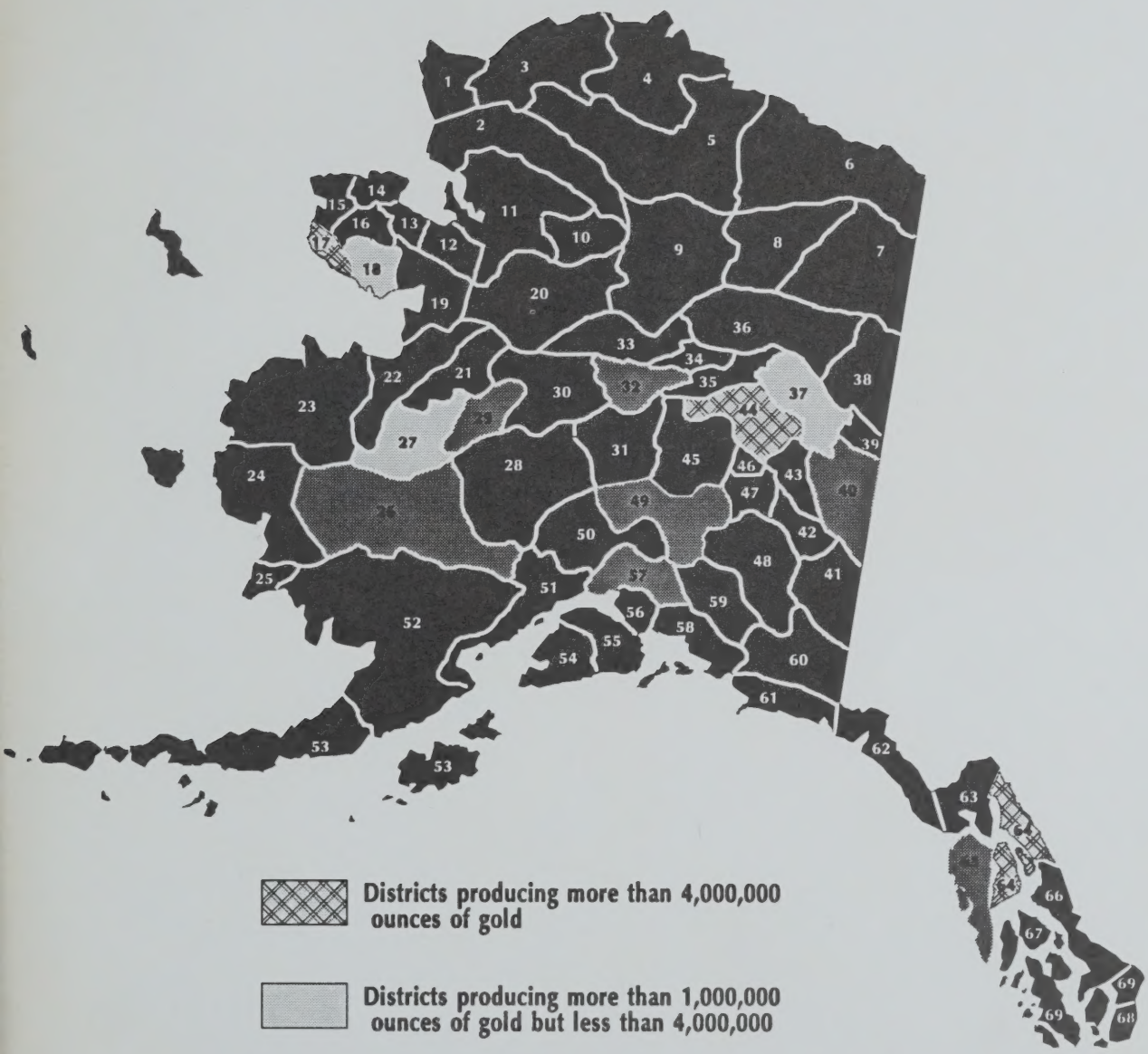
[c]Includes Georgetown and Donlin districts.

[d]Includes Tanana precinct.

[e]Placer gold included in Willlow Creek–Hatcher Pass district.

[f]Includes lode production from Glacier Bay and placer production from Lituya Bay district.

[g]Production that cannot be credited to individual districts due to lack of specific records or for reasons of confidentiality.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Districts producing more than 4,000,000 ounces of gold
Districts producing more than 1,000,000 ounces of gold but less than 4,000,000
Districts producing more than 500,000 ounces of gold but less than 1,000,000